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VIEWS, NEWS AND INTERVIEWS.

A story of a telephonic prisoner comes from Chicago. Manager George Crane, of the Court Reporting Agency, was surprised early one morning when he received a telephone message in his office from a woman who said she was imprisoned in a telephone box belonging to the agency, situated on the second floor of the building. Mr. Crane hurried to the second floor and found the door of the booth closed and locked, while the sounds from within dispelled his doubt as to whether or not the message he had received was a joke. The man who had charge of the keys was ill and would not be down to work. This information was conveyed to the prisoner by way of the ventilating hole in the box. The woman sobbed and said she would stand the expense of a locksmith, but the custodian of the building appeared, sprung the lock, and released her. The prisoner said she had stepped into the box to call up a friend. She shut the door, not knowing that it was provided with a spring lock. The remarkable part is that she should have so promptly thought to call for rescue over the telephone.

The language of the trolley is finding its way into general use. A recent account of the attempt to stop a long-winded orator is given in the New York *Sun* as follows:

The chairman reached over and pulled the doctor by the coattails, but evidently pulled them twice instead of once. At any rate, the doctor interpreted the signal, "Go ahead."

The doctor continued, anyhow.

One of our daily contemporaries, the *World*, commenting on Herr Pollock's improvement in telegraphy, by which he claims to be able to transmit 60,000 words per hour over one wire, says: "It will be chiefly important to the society reporter, who will now be able to give a verbatim report of an afternoon tea."

At a recent meeting of the board of trustees of the University of Pennsylvania, the provost was authorized to extend an invitation to the American Association for the Advancement of Science to hold its meeting in 1900 at the University.

A jackie on the United States steamship "Raleigh," in reply to a question by a reporter, said: "A Thanksgiving dinner! Yes, we had one, and we had an exhibition by the men, too—dancing and all that. The 'Olympia' men knew that there was some beer sent out from home that hadn't been said much about, and one of the men rigged up a telephone and played he was talking to Milwaukee, and wanted to know when that beer was coming. Well, the admiral was there in the audience, and that same day the beer was served on all the ships. We've got 20 'Olympia' men aboard now that'll swear to it."

A company has been formed which is seeking the right to join Baker street and Waterloo road, London, by means of an underground electric railway. The distance is four miles, and the estimated cost of the work is £2,300,000.

Dr. J. J. Deshler, of Glidden, Iowa, is a New York visitor and paid the REVIEW office a pleasant call. Dr. Deshler was one of the first subscribers to this journal and has always remained one.

Extension of the Third-Rail System on a Steam Road.

The New York, New Haven & Hartford Railroad has decided to extend the third-rail electric system on its Plymouth division from Nantasket Junction to Cohasset, a distance of about three and one-half miles. The rails have arrived on the ground and have been distributed along the track. Active work on construction will commence immediately. On completion of the road local trains will be run by electric motors, with the ordinary passenger equipment. For the through service steam locomotives will be retained.

UNITED STATES CABLE SHIP "HOOKER"—VIEW LOOKING AFT FROM FORECASTLE, SHOWING CABLE BEING RECEIVED ABOARD FROM SCOW AND COILED IN TANKS —THE MEN IN THE FOREGROUND ARE SPLICING ON A NEW LENGTH OF CABLE.

Electric Equipment of Manhattan.

Vice-president Skitt, of the Manhattan Railway Company, of New York city, is quoted as saying in an interview: "We are advancing the change of motive power rapidly and to us most gratifyingly. We have solved certain problems with a readiness and perfection not before achieved, and of course we have had the benefit of such experience." He also says that the transfer tickets for interchange with Third Avenue are already printed, so that the arrangement can be put in operation shortly.

The Michigan Telephone Company made a net gain of 1,326 subscribers in March in the state of Michigan.

THE UNITED STATES CABLE SHIP "HOOKER."

THE SHIP THAT WILL LAY CABLES BETWEEN THE PHILIPPINE ISLANDS.

At Morse's shipyard, in South Brooklyn, the United States Army transport "Hooker," No. 1, is being fitted as a cable ship for service in the Philippine Islands. The history of this ship is exceedingly interesting. She was built several years ago in England, and at the outbreak of the late war was the passenger ship "Panama," in the service of the Compania Transatlantica Española, running between Havana and other West Indian ports and Spain. She was captured after a hard chase by the United States auxiliary cruiser "Mangrove," and served for a while as a regular transport ship for the army, receiving the name "Hooker."

When the urgent necessity for connecting the various islands of the Philippine group by cables became evident, it was decided to fit this ship out as a cable vessel, she being the first craft of this type ever owned by the United States Government. Extensive alterations were made, nearly all of the interior fittings of the ship being removed and three tanks for cables installed, as well as refrigerating-rooms and appliances for the transportation of fresh meat. The forward cable tank is 13 feet in diameter and eight feet high, and has a capacity for 60 tons of cable. The midships tank, 24 by 13 feet, has a capacity for 400 tons, and the after tank, 26 feet in diameter and six feet deep, will contain 240 tons, the total capacity thus being 700 tons of cable. These tanks are circular and slightly conical in shape, and are built of boiler iron with calked joints, so as to be watertight. When the cable is coiled in place in them it is covered with sea water, partly to serve as a continuous outside connection for the testing circuits and partly to preserve the cable, as gutta-percha (the only insulator which can be used for deep-sea cables) deteriorates rapidly when exposed to the air. On the main

deck forward is installed a winding gear, consisting of a drum about eight feet in diameter, supplied with brakes and the usual accessories for cable work. In the bows is a boom, carrying at its end a pulley over which the cable is paid out. The illustration shows very clearly the winding drum, and also a scow-load of cable lying alongside and being coiled into the forward tank. The men in the foreground are engaged in splicing on the new section of cable to that already in the tank. This view of the ship was taken from the forecastle, looking aft, and shows part of the new superstructure which has been placed upon the "Hooker." Directly under the pilot-house is the cable testing-room, where sensitive galvanometers are kept in constant connection with a small battery and the cable coiled in the tanks. Here are installed various instruments of precision, including high-resistance Wheatstone bridges and sensitive Kelvin marine galvanometers. The room is arranged so that it can be darkened for observations with the reflecting galvanometer.

The refrigerating plant is sufficient to accommodate 150 quarters of beef, and the ship will be of use not only for its legitimate purpose of cable-laying, but also as a supply ship. The old electric light plant which the ship contained when captured has been removed and replaced by a new one, which consists of two 175-light units, each composed of a C & C dynamo direct-coupled to a Buffalo Forge Company's engine. The Vance Electric Company, of New York, installed all of this plant and the wiring, including two searchlights, which will be carried on the flying bridge forward.

It is expected that the "Hooker" will have a cruising speed of about 13 knots. She is 333 feet long over all, 33 feet beam, about 2,000 tons burden, and has an engine of about 1,600 horse-power working a single screw. In order to better fit her for cable service the forecastle has been heightened about six feet, giving her a high freeboard forward. On top of this forecastle are mounted two Hotchkiss six-pounder rapid-fire guns for use in the pirate-infested seas in which the ship's work will be done. The magazines for these guns are directly below them. In addition, the ship will carry about 75 stands of small arms. The complement of officers and men will consist of 150, Capt. C. L. Fenton, of the Quartermaster's Department, being in charge of the army force, while Capt. S. J. Hanlon is in charge of the navigation of the ship. The reconstruction of the vessel and its equipment for its new use has been under the direction of Mr. Gardiner C. Sims, supervising engineer for the army transport service. Mr. Sims will be remembered for the admirable work which he did aboard the United States repair ship "Vulcan," during the blockade of Cuba and after the sea-fight at Santiago. It is expected that the "Hooker," having on board 240 miles of cable, will sail for the Philippines about May 1.

Electric Conduits and Disease.

The London *Lancet* says editorially: The electric light in our houses is a delightful luxury, but it is not certain that, while the electric companies pay every attention to the insulation of their cables and "leads," they bear in mind certain other conditions which are none the less essential to the health and comfort of the householder.

A correspondent points out, for example, that in the town where he lives the main cable supplying the current is laid in a four-inch pipe beneath the public footpath with branch pipes for house connections, the ends of which are left open. The higher temperature inside the houses induces an indraught of air by these open pipes, and, as different houses vary in temperature and these pipes form a direct communication from house to house, so there is a circulation set up between one house and another, the current of air varying in velocity according to the range of temperature. In the case of houses warmed throughout by a hot-water system the temperature may be as much as 25 degrees Fahrenheit higher than the external air, a condition which causes an influx of air of sufficient velocity to blow out a candle flame. In this way the infected air of a house where infectious disease is present might easily be drawn into other houses with serious results. The conveyance of smallpox by aerial agency is established, and it is conceivable that it could be conveyed from one house to another in the manner just suggested. There is the possibility of other contagious diseases being spread in the same way.

The preventive measure is clear; the pipes should be plugged with insulating material so as to stop the intercommunication of the atmosphere between one house and another.

ITEMS OF INTEREST.

The National Carbon Company has raised the wages of about 400 men employed in its Cleveland, Ohio, plant. The advance ranges from five to 15 per cent.

The contract for the electric lighting of Havana has been given to Messrs. Dubois & Boulanger, who will construct an $80,000 plant. Eight thousand dollars was deposited as a cash guarantee.

The American Telephone and Telegraph Company has secured a 25-year franchise in St. Paul, Minn., under which it is required to pay to the city a three per cent tax on gross earnings from local business.

Charles R. Huntley, general manager of the Buffalo General Electric Company, announces that on May 1 that company will make great reductions in the price of incandescent lighting in Buffalo, N. Y.

The government has been unsuccessful in securing figures for comparison from the Edison Electric Company, of Cincinnati, to be used in statistics being prepared on the relative expense of municipal and private electric light plants. The company refused to allow the government representative to see its books.

A director of the Mexican Telephone Company says: "Any talk of dividends for Mexican Telephone stock under present conditions is ridiculous. The company is earning about $20,000 in gold per annum, but the present management is putting this money into the property as fast as earned and will continue so to do."

The Batavia, N. Y., Consolidated Gas and Electric Company has just completed arrangements for the purchase of the plant of the Attica Gas Company, and the fixtures and appurtenances thereof will be removed to Batavia about May 1, under the supervision of Superintendent Edward Wakeman. Attica now depends for its supply upon its natural gas fields.

A firm in Vienna has recently obtained a municipal concession to operate a telephonic news agency business throughout that city. The plan is modeled after a similar concern which is now in existence in Budapest, and its object is to communicate the news of the day to subscribers at certain hours during the daytime, and at other times recitations, music and other forms of entertainment.

The Southern New England Telephone Company will change the location of its New London, Ct., exchange on May 1. The offices will be removed from the Union station to the Long Building, a block away. The new offices are located on the second floor of the Long Building, and are much better adapted for the purposes than the Union station. The new offices have been equipped with all the latest appliances, and will have a new switchboard.

Another large electrical engineering company has just been formed in Naples, Italy, according to advices received here recently, to be known as La Societa Meridionale de Elettricita, with a paid-in capital of nearly $1,000,000. The company is to undertake several important contracts, having already decided to put down a plant to utilize the water-power of the Tusciano River, and to distribute the electrical energy generated for power purposes to the many industrial concerns at Salerno and Torre Annunziata.

The Conshohocken, Pa., gas and electric light and power companies, recently absorbed by the Electric Company of America, have reorganized, with the following officers: President, Col. A. Louden Snowden; secretary and treasurer, Frank B. Ball, both of Philadelphia; directors, Joseph B. McCall, of Philadelphia, and Henry M. Tracey and Horace C. Jones, of Conshohocken. The officers of the Electric Company are the same, with the addition of H. T. Hartman, of Philadelphia, as director.

Vienna's new system of urban and suburban railways is now assured. The *Official Gazette* publishes the text of the concession from the minister of railways, Dr. von Wittek, to the Siemens & Halske Company for the construction of a network of subways under the business center of the city, the lines which run in these subways rising to the surface in the less congested districts and changing from underground trolley to overhead trolley when the suburbs are reached. Vienna has now 30 metropolitan horse-car lines. In place of these, 69 urban and suburban electric tramways will be constructed, the work of transformation taking, it is expected, about five years.

Big Copper Deal Reported.

A report was current in Wall Street on Tuesday of this week that Messrs. Morgan, Rothschild and Rockefeller had formed a combination of the biggest copper interests in this country, with a capital of $400,000,000.

New Types of Electric Launches.

The first electric boat was probably the first automobile mechanism of any sort to be propelled by electricity. It was in 1833 that Jacoby, using a very crude form of rotary motor and primary batteries, navigated an electric boat on the Neva at St. Petersburg. These early experiments, like those made by the pioneers in electric traction, were afterwards almost forgotten, and electric boating did not become popular until the perfection of the accumulator made the source of power-supply reasonably low in cost and entirely reliable.

The illustrations on this page show a recent type of electric launch, representing a variety of design due to some years of experience with such craft, and also the controller and motor mechanism employed. The remarkable advantages of the electric boat—whether yacht-tender, gig, launch, fishing boat, cabin boat, or what not—have made it extremely popular with devotees of aquatic sports. Probably the first extensive experience with such boats, in the United States, was gained at the World's Fair in 1893, where the fast and silent electric launches were a well remembered feature of the transportation facilities of the exposition. With the knowledge resulting from this hard-service test, and added experience in building many launches since, the builders of the boat here illustrated laid the foundation for the present improved types.

One of the principal advantages of the electric launch is that its machinery is small in size and intrinsically heavy, thus permitting it to be stowed away in small compass and to serve as a ballasting weight, greatly improving the stability of the boat. The fact that all the motive equipment can go under the floor, or in a compartment abaft the after bulkhead, makes it possible to leave the cockpit, or seat-space, on such a boat as is shown in Fig. 1, entirely free of obstructions. It is hardly necessary to say that an electric boat is completely free from the heat, noise, odors and dangers of fire and explosion incident to steam and naphtha boats. Perhaps one of the greatest advantages, though, that the electric boat possesses is that its owner can run it himself, no matter what its size. To do this with a steam-boat he would have to pass an examination and receive a certificate as an engineer.

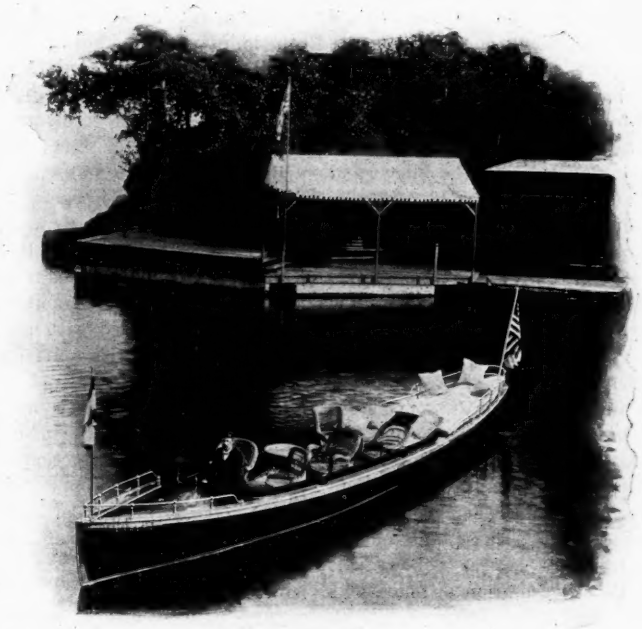

FIG. 1.—NEW TYPE OF 36-FOOT ELECTRIC LAUNCH WITH ALL MACHINERY BENEATH FLOORING.

The control is extremely simple and easy, being attained by grouping the battery in various combinations. Through the hollow shaft of the steering-wheel the controller axle projects, terminating in a small hand-wheel directly in front of the steering-wheel. Moved in one direction, by successive steps, this controls speeds ahead; moved in the other direction, it reverses the boat.

The motor is well shown in the illustration. A ball-bearing thrust-block is included in one of its journals, while the whole structure is water-tight below the shaft line. Connection is made direct to the shaft through a split coupling, there being no gearing, and, consequently, no noise.

The storage battery consists of elements in hard rubber cells, having a special watertight cover to prevent slopping in a sea-way. They are assembled on porcelain blocks, air spaces being left between the cells. Their number varies with the requirements of the charging current that is to be used with them.

These launches are built by the Electric Launch Company, Morris Heights, New York city, who also manufacture the equipments separate from the hulls. A number of larger craft than that shown, but of the same general type, have lately been built by the same concern.

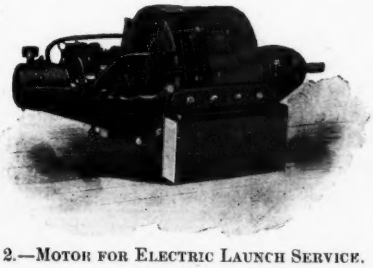

FIG. 2.—MOTOR FOR ELECTRIC LAUNCH SERVICE.

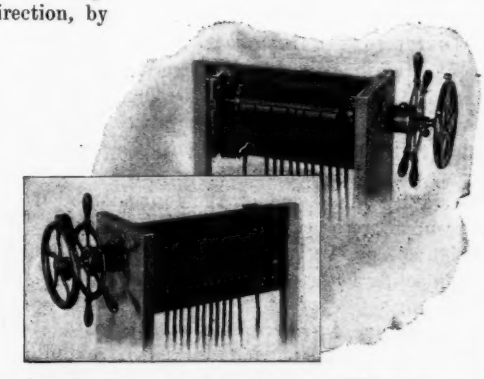

FIG. 3.—CONTROLLER AND STEERING WHEEL FOR ELECTRIC LAUNCHES.

ABSORPTION OF THE X RAYS BY AIR.

BY PROF. JOHN TROWBRIDGE AND J. E. BURBANK.

With the view of ascertaining whether better definition could not be obtained in X-ray photographs by using a tube exhausted of air between the Crookes tube and the object to be photographed, the authors have employed a glass cylinder 30 inches long and eight inches in diameter, closed at both ends with thin sheets of aluminum. This tube was exhausted to four millimeters' pressure and was interposed between the Crookes tube and the hand, for instance. Very little distortion was noticed, since the rays were more nearly parallel than when the hand is placed at the usual distance from the tube. The difference, however, in the light between the column of rarefied air and an equal column at atmospheric pressure could not be detected by the fluoroscope.

In the case of cathode rays, the absorption in the case of air at atmospheric pressure and air at four millimeters is as 33 to 1. Since the very short waves of ultra violet light are entirely absorbed by air, the behavior of the X rays is highly significant. The electrostatic effect produced by the Crookes tube on the column of rarefied air was very beautiful and remarkably analogous to the waving and fluctuating effect of auroral streamers, this action following the movement of the hand in the neighborhood of the exhausted vessel. When the concave terminal of the Crookes tube became the positive terminal the electrostatic effect vanished. No difficulty was found in closing the ends of the cylinder by aluminum plates, the buckling being prevented by suitable plate heads. The experiments will be continued in the hope of detecting the absorption by more sensitive means than a fluoroscope, or photographic plate.

Patent Suit on Storage Batteries.

The suit of the Electric Storage Battery Company, of Philadelphia, against the Hatch Storage Battery Company, of Boston, which was set for trial before Judge Colt in the United States Circuit Court of Appeals, at Boston, on April 22, has been postponed to April 28. The suit is for a preliminary injunction on an alleged infringement by the defendant of the Brush patent covering the support of the active material in a storage battery plate.

SCIENCE BREVITIES.

LIQUID AIR—In a long communication to the *Scientific American* Prof. Henry Morton attacks the claim of certain promoters of liquid air that with three gallons of that fluid they could make 10. He says, in part:

"We are told that Mr. Tripler uses to make his liquid air a steam engine of 50 horse-power, and that with this he can make liquid air at the rate of 50 gallons a day. This I know, from other sources, is substantially correct, and means that each horse-power in a day (say 10 hours) makes one gallon of liquid air. In other words, one gallon for 10 horse-power hours.

"It is again stated that a cubic foot of liquid air contains 800 cubic feet of air at ordinary atmospheric temperature and pressure, or, in other words, any volume of liquid air, if adequately heated, will expand 800 times in reaching atmospheric temperature and pressure. This also is substantially correct.

"We may remark in passing that this is nothing wonderful; for water, when expanded into steam at atmospheric pressure, increases about 1,700 times in volume, or more than twice as much as liquid air.

"Now if we apply to the above data the well known and universally accepted formula for the maximum work done by air when expanded at constant temperature, we find that a pound of liquid air in expanding 800 times would develop about 190,000 foot-pounds of work. As a gallon of liquid air weighs about eight pounds, this would give eight times as many foot-pounds, or 1,520,000. If this work were accomplished in an hour it would represent almost exactly three-fourths of a horse-power, because one horse-power means 1,980,000 foot-pounds of work per hour, and 1,520,000 is only a trifle over three-fourths of this.

"From the above it follows as a matter of absolute certainty that the maximum power which liquid air could develop in an ideally perfect engine without any loss from friction or other cause would be three-fourths of a horse-power for an hour for each gallon of liquid air expended.

"We have seen, however, that with his 50-horse-power plant, which on account of its size should operate with considerable efficiency, Mr. Tripler makes only one gallon of liquid air with 10 horse-power hours. In other words, he requires to make a gallon of liquid air 12 times as much power as a gallon of liquid air could possibly develop in an ideally perfect engine.

"In face of this, how supremely absurd is the statement that with a little engine, lacking all conditions for efficient working, he can make 10 gallons of liquid air by the use of three!"

FREQUENCY AND FEELING—Mr. E. W. Scripture sends to *Science* an interesting communication on the "Anæsthetic Effects of a Sinusoidal Current of High Frequency." This experimenter claims to have found that the anæsthetic effect may be produced by sending the current longitudinally along the nerve. Thus, a current sent along one of the nerves of the arm can be used to produce anæsthesia in parts of the arm supplied by it. With a pleasant current of about 28,000 alternations per second passing between the elbow and the hand, a needle can be painlessly run into the forearm. Mr. Scripture also made experiments as to the action of the current on the tongue, with the view of trying how far the theory that the sensation of taste is due to vibration is correct. The experiments, however, showed that alternating currents up to about 29,000 complete periods per second produce no sensations of taste whatever—the only sensation is that of tickling and puckering. The author's conclusions as to the relations between frequency and sensation are as follows: 1. Threshold of sensation of touch at a frequency of about 480 complete alternations per second; 2, threshold of disagreeableness at about 840; 3, threshold of pain at about 960; 4, disappearance of pain at about 1,440, followed by a peculiar, agreeable sensation; 5, disappearance of agreeableness at a point not yet determined, followed by a faint sensation; 6, disappearance of sensation at a point not yet determined. For constant conditions the author claims that these figures are quite constant, the probable error ranging from one-tenth of one per cent to four per cent.

INSTRUMENTAL DELICACY—A note in an English contemporary, describing some instruments recently used by Prof. Vernon Boys in determining the density of the earth, comments upon the delicacy of such apparatus by stating that some of the forces measured were equivalent to the weight of one-twelve-millionth of a grain acting at the end of a lever one inch long.

CHEMICAL DEPOLARIZERS — The following is translated and abstracted from an interesting article by M. G. Geiger in the *Revue Pratique de l'Electricite:* There are four great classes of depolarizing compounds, oxides, chlorides, sulphates and nitrates. Oxides are ordinarily solid, bad conductors of electricity, and most of them insoluble. Chlorides are generally solids, melting at a comparatively low temperature. Chlorides of silver, copper and mercury (mercurous chloride) are soluble in water. Chloride of lead is slightly soluble in cold water, while most of the others dissolve readily. With the exception of the sulphates of lead and barium most of the other sulphates are soluble in water. Nitrates are mostly soluble in water, and are employed in batteries generally in a mixture with sulphuric acid, which frees nitric acid, which, in turn, reacts upon the hydrogen.

Bioxide of copper is used in batteries of the Lalande type. This is a black powder made by calcining copper in contact with the air. Filings and turnings of the metal are heated in a refractory crucible to a red heat, then stirred with a copper rod and sprinkled with a little water.

Copper sulphate, commonly called blue vitriol, is generally made by roasting copper pyrites in contact with the air, or by the action of sulphuric acid on scrap copper. Water will dissolve 30 per cent of its weight of this material. Copper chloride has not proved a success as a depolarizing agent in batteries.

Black oxide of manganese is found in nature, and is employed in large quantities in batteries of the Leclanche type. Permanganate of potassium has given excellent results as a depolarizing compound. It is made by heating manganese oxide with potassium chloride and caustic potash. Potassium nitrate, commonly called saltpeter, is found in nature. It has been used with great success dissolved in weak sulphuric acid. It replaces nitric acid in Bunsen cells. A good composition for the purpose consists of water, 1,000 parts; sulphuric acid, 500 parts; nitrate, 850 parts.

Bichromate of potash has been very largely employed in recent years for this purpose. Lately it has generally been replaced by bichromate of soda, which answers the same purpose and is considerably cheaper. Hypochlorite of soda has been tried as a depolarizer, but without great success. Perchloride of iron has been repeatedly tried as a depolarizer, but without success, and the same may be said of chloride of tin.

The peroxide of lead has been used to some extent. Other salts of lead have failed to give satisfactory results. Both sulphate and chloride of mercury have been used in batteries, but on account of their low solubility these salts rapidly weaken on low-resistance circuits.

Chloride of silver has been used for a long time in certain forms of batteries intended to give extremely constant electro motive force. Nitric acid has been used since the early days of the electric battery, but has many practical inconveniences. M. D'Arsonval proposes to substitute for it an electrolyte composed (by volume) of one part of nitric acid, one part of hydrochloric acid, and two parts of water acidulated with one-twentieth of sulphuric acid.

A PROPHETIC FORECAST—A correspondent calls attention to a passage in *The Spectator* (No. 241 of the year 1711) which is interesting in connection with wireless telegraphy and telegraphy in general. The passage reads thus:

Strada, in one of his prolusions, gives an account of a chimerical correspondence between two friends by the help of a certain loadstone, which had such virtue in it that, if it touched two several needles, when one of the needles so touched began to move, the other, though at never so great a distance, moved at the same time and in the same manner. He tells us that the two friends, being each of them possessed of one of these needles, made a kind of dial-plate, inscribing it with 24 letters in the same manner as the hours of the day are marked upon the ordinary dial-plate. They then fixed one of the needles on each of these plates in such manner that it could move round without impediment so as to touch any of the 24 letters. Upon their separating from one another into distant countries they agreed to withdraw themselves punctually into their closets at a certain hour of the day and to converse with one another by means of this their invention. Accordingly, when they were some hundred miles asunder, each of them shut himself up in his closet at the time appointed, and immediately cast his eye upon his dial-plate. If he had a mind to write anything to his friend, he directed his needle to every letter that formed the words which he had occasion for, making a little pause at the end of every word or sentence to avoid confusion. The friend, in the meanwhile, saw his own sympathetic needle moving of itself to every letter which that of his correspondent pointed at. By this means they talked together across a whole continent, and conveyed their thoughts to one another in an instant over cities or mountains, seas or deserts.

AFRICAN TELEGRAPH LINES — The British Government is rapidly closing the gap in the land-lines from "Cairo to the Cape." It has just been announced that lines are working now as far south from Cairo as Sennar on the Blue Nile.

NOTES ON LIGHT.

BY WILLIAM ROLLINS.

NOTE LIX—INTERMOLECULAR JOURNEYS.

I wish to state concisely what some who have read my previous notes have failed to understand; namely, that material particles can be made by electricity to pass between the molecules of cold, dense, homogeneous metals. This is true of even the densest metals I have been able to obtain for experiment. Mr. Tesla, who always sees everything in the direction he is looking, stated, I find in this journal three years ago, that particles of gas from the interior of a vacuum tube passed outward through the glass. These outward journeys left the tube in too exhausted a condition to do its work. Of return journeys through glass I shall speak later. I mention them now, hoping others will also give us practical solutions of the problem.

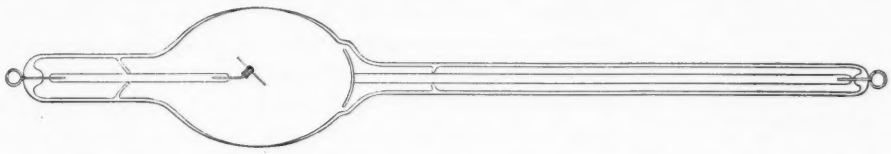

FIG. 56.—"NOTES ON LIGHT"—ROTARY TARGET TUBE WITH INTERMOLECULAR VACUUM REGULATOR AND TERMINALS WITH BARE STEMS.

NOTE LX—SYMMETRY IN TUBES.

In designing the aim should be to combine efficiency with beauty. As before mentioned, a regulator on the side of a vacuum tube is not pleasing. I have, therefore, aimed to find better positions and have shown some of my results as applied to cooled terminal tubes. In Fig. 56 the same plan is applied to a tube with an uncooled target. The regulator is on one end of the tube serving also as a support for the anode stem and as a place to attach a wire from the generator. I have selected one of my rotary target tubes for the illustration, because these are in use in a large hospital where there is an apparatus that soon perforates a stationary uncooled target of the usual kind. It is now three years since I made a tube with a cooled target, which would bear 10 times the power of the generators in use. I hoped then to soon see such a rapid development that such tubes would be necessary, but, even at the present time, there is no commercial apparatus where the power is sufficient to make them essential. One can form no clear idea of the possibilities of this invaluable method of medical diagnosis from the results obtained with the best commercial apparatus. With the best generators available, no better results can be obtained in photography than the remarkable ones shown by Professor Goodspeed three years ago. We must turn to the experimental results of Tesla and Trowbridge to see what may be done. Take, for example, the fact that the latter has made a photograph of the bones of the hand in a millionth of a second. Why, it would tax the best commercial generator to the utmost to do this in less than 2,000,000 times as long. What a vista this opens. If we concentrate all the power of an ordinary generator on an oval spot on the target two millimeters long, a thin bit of platinum will stand the full force of the Crookes's stream without melting. This gives some idea of how feeble such an apparatus is. Speaking of the Crookes's stream reminds me that this was discovered by Varley, who published his work in 1871. He not only observed the cathode stream, but also its effect on a pivoted mica vane. This is another illustration of what I mentioned in Note LVII. As I learn more about vacuum tube research I am constantly finding similar cases, and, even with my present limited knowledge, could make quite a list of them. But to return to my subject. Is it not singular that three years after Roentgen's discovery of the transparency of the human body to some of Lenard's rays that this most important method of diagnosis should not have come into general use? Not one physician in a hundred employs it regularly, and yet with some diseases it enables us to make the earliest diagnosis. To show how important this is, take consumption, which is responsible for one-seventh of the deaths from disease. If every one would be regularly examined, a matter taking only a short time, most of the cases could be saved, for Williams has proved that the signs can be detected so early that treatment is followed by prompt recovery, many cases not even requiring a change of climate. This latter is of the utmost importance as consumption is a disease of the poor, who can not often give up their work and go away. The fluoroscope in Dr. Williams's hands is constantly showing evidences of old tubercle scars in patients who never suspected they had been attacked by the disease. This is a point of great interest, for if in so many cases nature has unaided effected a cure, we may expect, with a little help from medicine, that almost every case can be saved. These details may seem out of place in a non-medical journal, but they are introduced for a purpose, as I am convinced that outside pressure is needed to hasten the adoption of the most important method of diagnosis discovered in my lifetime. Although my own work in medicine is in a limited field, I am in a position to see the prime importance of the method and to be distressed at its slow adoption. I know that at present efficient apparatus must be built at home and that it is large and expensive, but if Mr. Tesla could be induced to work on the problem it would be quickly solved, the apparatus being made efficient, compact, powerful and not expensive. As stated in previous notes it is only a matter of harmonics—a little generator if we knew how to tune it could accomplish great results.

NOTE LXI—ON GLASS WRAPPINGS.

Wrappings may have been appropriate for anything so old and dead as a mummy, but for vacuum tubes which are young and should be vigorous they are out of place. They are fetiches we have worshipped long enough. With any considerable force they get knocked from their pedestals, falling down as discolored fragments in the tube. As the glass wrapping about the anode stem was the first to go I tried the effect of shortening the stem, and finding this was an improvement, I also reduced the length of the wrapping, finally removing it entirely as in the tube here shown December 1, 1897. I next shortened that about the cathode stem and should have early abandoned it if two great experimenters, Lenard and Tesla, had not definitely stated that it was of value. I have now for some time discarded any covering for either terminal, not only without injury to the tube but to its distinct advantage. A tube of this kind is shown in Fig. 56. The method of supporting the bare stems is excellent and when these are of large diameter, three-sixteenths of an inch, the tube will bear any reasonable amount of jar in use or transportation. There is also another point about this tube which is of practical value—the large size of the wire loop forming the connection with the leading wire. These are usually small and delicate. They break easily and are difficult to find in a darkened room. It is irritating to hunt for the place to connect a wire, or to need to use care in its attachment. In some commercial tubes the danger of breaking the little wires is overcome by attaching brass caps on the ends, but these are objectionable as they prevent heating the tube, a process which should always be gone through with before exciting, to diminish the danger of puncture from the powerful current needed to overcome the high vacuums which are required for some work. Even with lower vacuums this preliminary heating is desirable, because with our present knowledge we can not make a tube which will give the same wave-length to the light when the tube is cold as when it has been run and become hot. A tube such as here shown is a small though distinct advance upon the usual commercial types.

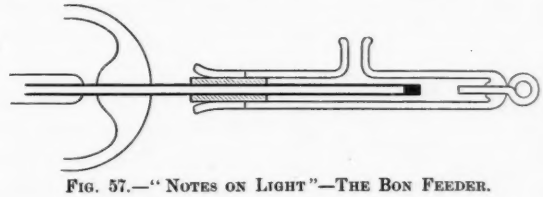

FIG. 57.—"NOTES ON LIGHT"—THE BON FEEDER.

NOTE LXII—THE BON FEEDER.

A friend having shown me a nursing tube of his invention, that had saved the life of a grandchild, I wanted to see if I also could not devise something new in this field. Having no grandchildren whose lives needed saving, it seemed best to construct it for a vacuum tube, which at that time was in a very exhausted condition. Fig. 57 shows the result. It is a bit of glass tubing partly filled with acidulated water held in by the rubber cork, which serves also as the support. To charge the regulator tube with hydrogen, connect the current in such a way that the gas will be liberated at the surface of the regulator tube, which should be of some metal that rapidly absorbs the gas. The device has amused me and may be of use to some one.

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This is the season of the year when the wily lightning-rod agent drives about through the rural districts in a light wagon and inveigles the farmer into having his house and barn decorated with rods. It is an open question whether any lightning-rod of the usual type is a safe ornament for a building. It probably is useless, and there is some ground for thinking that it is dangerous. However, if one really needs lightning protection for an exposed building, the common barb wire of commerce is about as good as anything. Lines of it tacked along the roof and ridges and then brought down to a good earth connection, such as an iron pump in a well, will give better protection than the most elaborately fluted lightning-rod with a gilt ball finial and glass "insulators."

The description, in our last issue, of an English electrolytic alkali works gives a good idea of the importance and possibilities of the growing industry of electrolytic manufacture. Very few members of the electrical profession know how large the growth of electro-chemical industries has been, or what important improvements the new methods have wrought in old processes. In the manufacture of caustic soda, bleaching powder, chlorate and permanganate of potash, the electrolytic processes have practically replaced the older and more expensive chemical methods, resulting in an increased output and cheaper product. The value of these processes, however, has not been confined to established chemical industries. They have made aluminum a commercial possibility and given to the arts at least two new materials—the acetylene-forming carbides and carborundum.

In all the present hue and cry over "wireless telegraphy" people are apt to forget what was done many years ago. The first experiments with the electrical transmission of intelligence without conducting wires were made 68 years ago. In 1831 James Bowman Lindsay, of Dundee, Scotland, conceived the idea of conveying electric signals across water without the use of wires, and actually did so convey them across the Tay River. He even went so far as to express the opinion that signals might be conveyed across the Atlantic, and in the printed proceedings of the British Association for 1859 his method is briefly described. Lindsay was an extraordinary man. From a humble weaver he advanced to the position of science teacher, and in the advertisement announcing the opening of classes, which appeared in the *Dundee Advertiser* of April 11, 1834, he predicted the electric light and the use of electricity for driving machinery and other purposes. In 1835 he publicly exhibited an electric lamp in Dundee.

A committee of the Common Council, of Orange, N. J., has gone all the way to Chambersburg, Pa., to "inspect" a municipal electric street lighting plant there with a view to the establishment of a similar institution in their own town. It is to be hoped that the committee will have a good time, but to be feared that they will be led away by the old fallacy of municipal ownership. One of the reasons why town councils are misled into extravagant and dangerous experiments in this direction is that it is so easy to deceive them about technical matters. It is reported that the Orange council was informed by an engineer that a plant could be built to supply their 304 full arcs at $36 a year each. The present price is $85. In Detroit, which has admittedly the best equipped and managed municipal lighting plant in the United States, the last report of the Lighting Commission gave the cost to taxpayers as $83.50 per light, and adds that:

"The results, such as they are, have been secured only by the practice of the strictest economy and the rigid exclusion of all those elements apt to intrude into the administration of public municipal affairs and which operate only to confound business principles and political expediency in perplexing entanglement."

It is to be remembered that this plant pays no taxes, and that depreciation is figured at only three per cent.

MARCONI'S SYSTEM AGAIN.

A press telegram, published a few days ago, reads:

"The *Pall Mall Gazette* publishes interviews with persons interested in Marconi's system of wireless telegraphy, in which they express their belief that communication with the United States by means of the system is practicable. The question has not yet been taken up, however, as all the time has been devoted to experiments. There is no intention of competing with land lines."

This is interesting, if true, but there can be no doubt that the company will not compete with sea-lines either. Let us make a few figures. The distance from London to New York is about 74 degrees 50 minutes of the arc of the earth's great circle. Taking the radius of the earth to be 4,000 miles, the towers at the two ends of the line would have to be 1,038 miles high—and even then the messages would graze the surface of the Atlantic. Was ever any scheme more preposterous?

While any Hertz-wave system is open to this objection, it by no means follows that no system of "wireless telegraphy" is competent to signal across 3,000 miles of sea. The system that was suggested about 68 years ago by Lindsay, and more recently by Prof. Sylvanus Thompson, would work, beyond doubt. The main thing is that it would be of no particular value after it worked. It would broadcast its messages so that they could be read by any one, and would entirely lack the essential element of secrecy. Furthermore, only one such transmission could be worked at a time, because a system powerful enough to send its signals from England to America would interfere with the working of all similar systems in Europe.

Notwithstanding all these perfectly evident facts, the cable from London informs us that:

"Telegraph shareholders are becoming alarmed at the success of the experiments with wireless telegraphy. Eastern Telegraph Company's shares were quoted at 160 to-day, while last week they were quoted at 180, but the fall is due possibly to the probable construction of the Pacific cable.

"An official of the Anglo-American Telegraph Company in an interview to-day said: 'While recognizing the scientific value of Marconi's wireless system, I do not regard it in the light of a rival that is likely to encroach upon our preserves. I fail altogether to understand how Marconi can counteract the great curvature of the earth that is to be met across the Atlantic. There is a great difference between crossing the channel, 30 or 40 miles, and crossing the ocean, 4,000 miles.'"

THE X-RAY AS A DETECTOR OF CONSUMPTION.

The statement in Dr. Rollins's article on another page, that most cases of consumption—a disease responsible for one-seventh of the deaths from natural causes—could be caught in time and cured if X-ray diagnosis were general, is startling testimony to the importance of Roentgen's discovery. For years the medical profession has fought the deadly tuberculosis germ, but generally with the more or less empirical means that constitute its offensive equipment in the battle with disease. It is, perhaps, a tradition of conservatism among physicians that has delayed the universal adoption of X-ray diagnosis, but if it is true that such a measure would contribute to the suppression of consumption, it becomes a duty to use it. The question is one of absolutely vital importance. If this fearful disease can be gradually eradicated the human race will have been more benefited by the X ray than by any other application of electricity. At any rate it is good to look forward into the twentieth century and think of the betterment of mankind that will be derived from the work of our contemporaries. In this beneficent task electricity will surely hold the first place.

WHAT LIQUID AIR WILL NOT DO.

There has been a good deal of talk lately about the wonders of liquid air. Some of it has been true and some of it has rather led the thoughtful reader to believe that it was air in the form of wind that the promoters of various schemes have been working upon. It is gratifying to read a clear and sensible statement concerning the folly of the latest claims for this agency, such as appears in another column. Professor Morton punctures the bubble very neatly and in a manner that can not be misunderstood. Incidentally he gives some figures that are well worth knowing. For example, he says that a gallon of liquid air, about eight pounds of it, expanding to normal temperatures, has a total possible capacity for work of about three-fourths of one horse-power. A good engine might realize one-third of this—say one-fourth horse-power. This is only a little better than the specific energy of modern accumulators, and does not take into consideration the weight of the containing vessel for the liquid air. A pound of liquid air, and its receptacle, would contain no more capacity for doing work than an equal weight of accumulator, which neither explodes nor refrigerates its surroundings. Hence the delusion that liquefied air would furnish the ideal power for automobiles is cruelly shattered. It may have other uses, and its production is a triumph of science, but it will not run automobiles economically, nor does it contain within itself the secret of perpetual motion.

It is announced that the Hoosac Tunnel is to be ventilated by means of an enormous electrically-driven fan. This is a good move, as anybody who has been through the tunnel will be willing to admit, but so long as electricity is to be called in to ameliorate its tartarean atmosphere, why isn't the work done thoroughly? To use steam locomotives in the tunnel, and then electric fans to blow out the smoke, is a makeshift arrangement. The obvious plan is to use electric locomotives. Then the tunnel could be whitewashed and purified—in fact, made an attractive part of the railway.

The latest development in electric traction is the theater car. On one of the roads running to Coney Island it is proposed to put on cars, which may be leased, having a stage built at one end, and to while away the tedium of the journey by a vaudeville performance *en route*. In this way the happy passenger will get a foretaste of the joys of Coney before he reaches that delightful spot. Of course, an extra fare will be charged on the vaudeville cars, and it is expected that they will do a rushing business on the trip out. Coming back the extra fare may be more of a consideration.

THE SUBMARINE TELEGRAPH LINES OF THE WORLD.

The summary of the history of submarine telegraph lines, printed on another page, shows that it is more than a century since the suggestion of cables was made. The real beginning of cable history, however, is with the English Channel cable of 1851. In the short space of 48 years, since this 25-mile stretch was laid, there has been a continuous growth of cable lines. To-day the only waters under which these nerves of civilization are not doing their work are those of the middle Pacific. Even these lonely seas are soon to be traversed by a cable, or possibly two—the last link in the electric girdle of the earth.

There are now in operation 1,460 lines of cable, of which 1,142 are owned by nations and 318 by companies. Their total length is 166,299 nautical miles, or nearly enough to reach eight times around the earth at the equator.

SEEKING A SUITABLE APPELLATION.

In last week's issue the ELECTRICAL REVIEW offered prizes for names for the self contained, self-propelled electric vehicle for use on ordinary streets and roads. The responses so far have been extremely interesting, and encourage the belief that a name which will fitly describe these self-moving vehicles will be discovered. A number of correspondents have seemed to think that a facetious title is desirable. Others have sent interesting letters containing arguments for certain designations, and it is proposed to publish some of these in an early issue. It seems safe to say that no other invention ever suffered under such a burden of names. At least 100 have been proposed, but not one seems entirely proper. The conditions of the competition for prizes are reprinted on page 272, in this number, and it is hoped that all readers of the ELECTRICAL REVIEW will enter the lists.

The stockholders in the Jernegan salt-water gold-extraction scheme have been informed that a 20 per cent dividend will be declared on May 1.

Pictures by Telegraph.

An instrument called the teledia graph has been installed in the office of the New York *Herald*, and connected in a circuit with similar instruments in St. Louis, Chicago, Philadelphia and Boston. The object of the instrument is to reproduce pictures and drawings, and it is claimed to be entirely successful in operation. The principle employed is the same as that used in the historical experiments of Bain, many years ago. Cylinders in the various stations are turned at synchronous speed by clockwork. At the sending end the drawing is made on tin-foil in an insulating ink, and wrapped around the cylinder. As this revolves a point, similar to a phonograph stylus, which rests in contact with the tin-foil, is moved axially by a screw. At the receiving end a similar screw moves a point which is driven against its cylinder wherever the sending stylus crosses an ink line and opens the circuit. It is said that the apparatus can be duplexed, and that it works well, even over long circuits. It is to be used in an exchange service of drawings by newspapers in the various cities named above.

Erie Telephone Company's Annual Report.

The sixteenth annual report of the Erie Telegraph and Telephone Company shows the operations of the Erie Telegraph and Telephone Company, the Cleveland Telephone Company, the Northwestern Telephone Exchange Company and the Southwestern Telegraph and Telephone Company for the year ended December 31, 1898. The Cleveland Telephone Company, the Northwestern Telephone Exchange Company and the Northwestern Telegraph and Telephone Company income account shows:

	1898.	1897.	1896.
Gross earnings	$1,747,240	$1,412,423	$1,023,619
Op. expenses	1,136,785	871,166	638,483
Net earnings	$610,455	$540,857	$385,136
Dividends	588,750	.....	.....
Surplus	21,705	.....	.....
Sur. prev. Dec. 31.	$212,662	.....	.....
Total surplus	$234,367	.....	.....

The Erie Telegraph and Telephone Company shows: Gross earnings, $423,650; interest and expenses, $219,076; net income, $204,574; surplus account, December 31, 1897, $233,293; total, $437,867; four quarterly dividends of one per cent, $198,000; surplus account December 31, 1898, $239,867; undivided surplus of the sub-companies due the Erie company, $180,243; total surplus, $420,109.

THE EFFECT OF ALTERNATING-CURRENT WAVE-FORMS ON TRANSFORMER LOSSES.

BY LOUIS DUNCAN, FERD. B. KEIDEL, WILLIAM L. HODGES AND EDMUND FRANK.

The currents represented by the waves of various shapes, as shown by the diagrams, were obtained by superimposing a third harmonic upon a fundamental wave. This was effected by using two separately excited dynamos driven at constant speed from the same shaft.

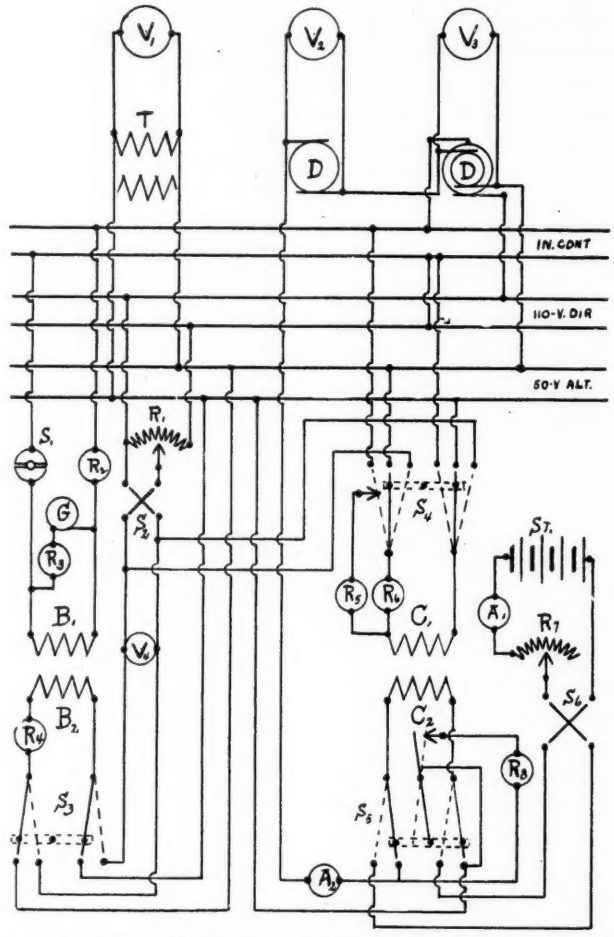
One of the dynamos used was an eight-pole Siemens alternator running at 540 revolutions per minute and generating an alternating current of 36 cycles per second. Mounted on the shaft of this machine was a 16-tooth sprocket wheel adjustable about its axis. A chain running on this sprocket wheel drove a pair of revolving brushes (by a 12-tooth sprocket wheel) at 720 revolutions per minute. These brushes revolved about the commutator of a bipolar continuous current dynamo made by the United States company. The fields being separately excited, an alternating current of 12 cycles per second was obtained by revolving the armature in the opposite direction.

The voltage of the fundamental wave used in the first eight curves shown was about 50 volts, while that of the superimposed third harmonic was about 15 volts. In the second set of curves, Nos. 9 to 12, the fundamental wave was about 40 volts, while that of the superimposed third harmonic was about 30 volts. The two dynamos were connected in series and the terminal electro-motive force on the transformer was kept constant at 50 volts by a Weston portable standard voltmeter.

The transformer used was a Westinghouse No. 8 "old style," designed for 133⅓ cycles per second. The four coils of the secondary (of 20 turns each) connected in series were used, the primary being left on open circuit.

The instantaneous values of the voltage plotted in the curves shown were obtained by using a calibrated electro-dynamometer marked B_1 and B_2 in the diagram. The instantaneous current used was obtained by a small adjustable brush, making contact once in each revolution of the brushes on the United States machine. The small brush was mounted on an adjustable brass ring marked in degrees, and rubbed on a small hardwood ring having a brass contact set into it. The two throw switch marked S_3 in the diagram was used for calibrating with direct voltage (the voltages being balanced for each reading), and readings were taken direct from the Weston voltmeter marked V_4.

The instantaneous values of the current plotted in the curves shown were obtained by using a calibrated electro-dynamometer marked C_1 and C_2 in the diagram. The instantaneous current used was from the same source as that passed through the other electro-dynamometer. The two-throw switch marked S_5 in the diagram was used for calibrating with direct current (the current being balanced for each reading), and readings were taken from the Weston milliammeter marked A_1. When obtaining the instantaneous values the three-throw switch marked S_4 in the diagram was placed in its left-hand position, thus placing the two resistances R_5 and R_6 in parallel and reducing the resistance in circuit with the movable coil C_1 from 10,000 to 2,000 ohms.



TRANSFORMER LOSSES—EXPLANATION OF DIAGRAM OF CONNECTIONS: A_1 = Direct-Reading Weston Milliammeter. A_2 = Direct-Reading Thompson Alternating Ammeter. B_1 = Movable Coil of Electro-dynamometer. B_2 = Fixed Coils of Electro-dynamometer. C_1 = Movable Coil of Electro-dynamometer Used as Wattmeter. C_2 = Fixed Coils of Electro-dynamometer Used as Wattmeter. D_1 = Siemens Alternator. D_2 = United States Direct-Current Machine. G = D'Arsonval Galvanometer. S_1 = Plug Switch. S_2 = Reversing Switch. S_3 = Two-Throw Switch. S_4 = Three-Throw Switch. S_5 = Two-Throw Switch. S_6 = Reversing Switch. St = Storage Cells. T = Transformer. R_1 = Adjustable Resistance of 100 Ohms (sliding contact). R_2 = Resistance of 300 Ohms. R_3 = Resistance of 4,000 Ohms. R_4 = Resistance of 1,000 Ohms. R_5 = Resistance of 2,000 Ohms. R_6 = Resistance of 10,000 Ohms. R_7 = Adjustable Liquid Resistance of 75 Ohms. R_8 = Resistance of 1 Ohm. V_1 = Weston Portable Standard Voltmeter (Alternating Current and Direct Current). V_2 = Alternating Voltmeter. V_3 = Alternating Voltmeter. V_4 = Weston Direct-Reading Voltmeter.

Number of curve.	1	2	3	4	5	6	7	8	9	10	11	12	13
"Idle" current in amperes..... ..	.565	.625	.645	.655	.655	.615	.575	.545	.460	.470	.585	.480	.650
Watts consumed (true watts).....	13.5 peaked.	14.5	16.5	18.35	19.5 flat.	18.25	17.5	15.0	11.25 very peaked	15.75	19.0 very flat.	15.5	17.0 sine.
Remarks													

The electro-dynamometer marked C_1 and C_2 was also used as a calibrated wattmeter. Readings of the deflections were obtained for each series of readings of the other instruments for each position of the instantaneous contact brush, the instrument being calibrated at the end of each set of readings. In calibrating the switch marked S_4 was placed in its right-hand position and a potential of 50 volts was caused to pass through the movable coil C_1. The lower switch marked S_5 being placed in its left-hand position a sufficient current from the storage battery marked St was sent through the stationary coil to give a deflection equal to the average deflection for the series of readings on the curve just completed.

The value of the "idle" current for each curve was obtained from a low-reading Thompson alternating ammeter marked A_2 in the diagram.

In the first eight curves shown the third harmonic was superimposed upon the fundamental wave in eight different positions, the position of the third harmonic being advanced 15 degrees in each case (with an advance of 120 degrees the curves repeat themselves). In the case of the next four curves (Nos. 9 to 12) the voltage of the third harmonic was increased to 30 volts and only four curves were obtained, the third harmonic being advanced 30 degrees in each case. No. 13 is the approximate sine curve used as a fundamental wave in the other cases.

In obtaining the instantaneous values of voltage and current for each different-shaped wave readings of instantaneous volts and amperes, "idle" current and wattmeter deflection were taken for each change of 10 degrees in the position of the small contact brush. These values were then plotted on coordinate paper, giving the forms shown in the diagram.

In order to obtain some standard of comparison between the various curves the speed was, in all cases, kept constant, and the same was done for the voltage across the terminals of the transformer, which latter was kept at 50 volts by means of a Weston voltmeter marked V_1 in the diagram. Care was taken that neither V_1 nor B_2 were using any current when readings on the wattmeter or alternating ammeter were taken, as otherwise the current used by these instruments would have caused considerable error.

In all the curves shown the degrees refer to the zero point of the funda-

mental wave, whose position was not changed.

From the table given above it is seen that the least watts were consumed by the very peaked wave No. 9, the value 11.25 being only 57.7 per cent of the maximum value in the case of the flat wave No. 5. For wave No. 9 the "idle" current is also the least, being only 70.2 per cent of the maximum value in the case of the flat wave No. 5. From this we see that the economy attained in the case of the peaked waves was considerably above that of the flat waves, and was even above that of the sine wave No. 13.

The apparatus employed in the above investigations is still in use in the electrical laboratory of the Johns Hopkins University.

Acetylene Gas.

So much exaggeration has been printed about the great economy to be found in using acetylene gas that it is refreshing to have the truth presented by such an authority as *Progressive Age*, the leading journal representing the gas industries, from which we quote:

Just because acetylene is a true and simple gas does not seem to be sufficient reason why the statements of its votaries should partake of the same expansive properties in the heat of argument or in the warmth of enthusiasm when dilating upon its merits. Acetylene has its niche in the economy of things which it will ultimately fill without any undue inflation, and any attempt to force the issue by the bombast and sophistry of the old-time promoter will rather tend to destroy confidence than secure rapid adoption of this gas as an illuminant. Because certain statements are to be found printed upon the pages of prospectuses or trade catalogues many are inclined to give them credence and act upon them, only to find the truth by actual experience and become disgusted with the entire business.

In order to show the character of some of the statements in American acetylene generator catalogues, a number of these pamphlets were examined. They are reproductions of each other very largely, and all contain comparative statements of the superiority and cheapness of acetylene over all other forms of lighting. These are so remarkable that we went to the trouble of compiling from nine of these catalogues the following table of cost in dollars per 100 candle-power hours:

City Gas.	Acetylene.	Ratio.
$6.25	$2.00	3.2
3.90	1.50	2.6
3.33	2.00	1.6
3.46	2.00	1.7
3.33	1.09	3.0
2.27	2.22	1.0
5.55	1.33	4.2
4.16	1.50	2.7
7.50	2.40	3.1

The average ratio is 2.6; in other words, it is claimed that city gas in general is 2.6 times as expensive for equal illumination as acetylene. This was certainly news to us, so that we concluded to try our hand in figuring upon the same problem.

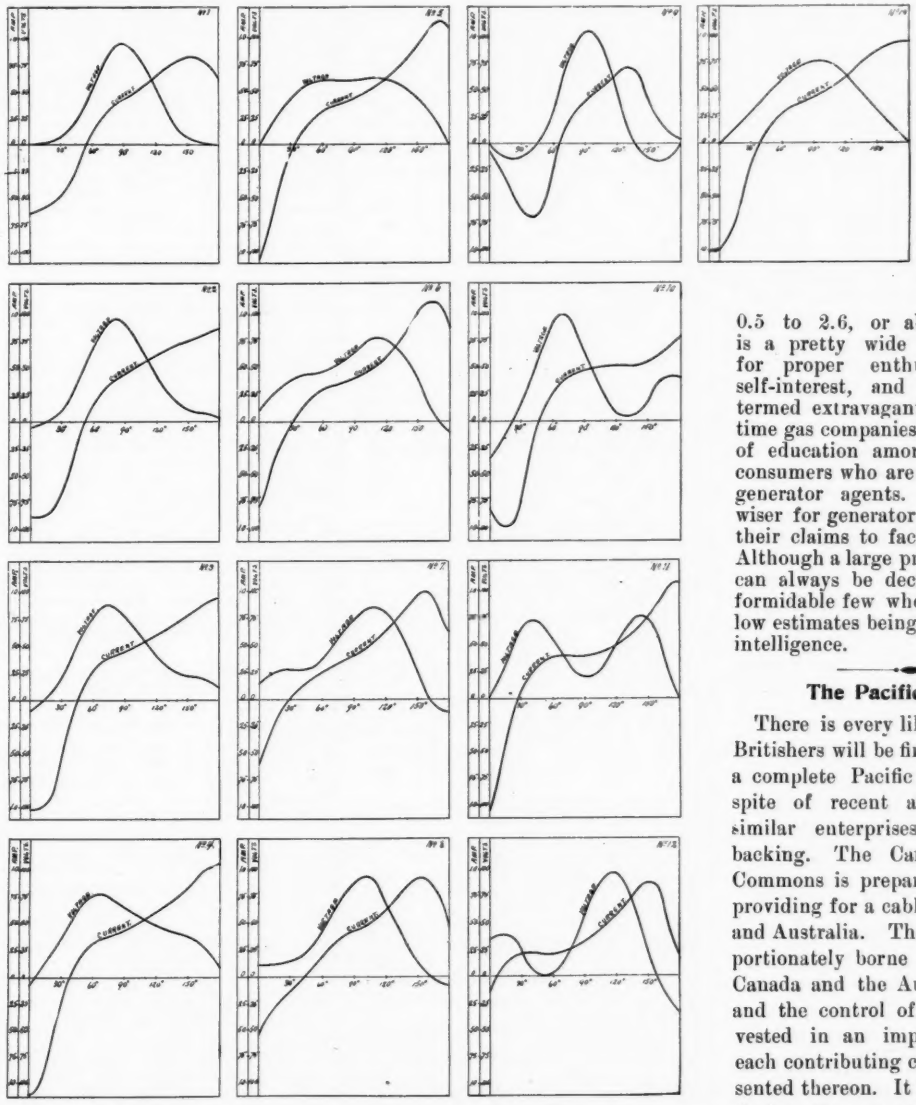
In their calculations these acetylene experts assumed 10, 15, 16 and 18-candle-power coal gas. Although 16-candle-power coal gas is common in England and France, where comparatively very little water gas is used, in this country our coal gas runs from 18 to 22, and water gas from 22 to 30 candle-power per five cubic feet per hour. If we assume an average of 22-candle gas we will be rather under than above the average. We are told also that the equivalent candle-power of acetylene per five cubic feet consumption per hour is 250, 300 and even 400 candles. The more conservative authorities place it at 240. The price for city gas is stated as high as $3, while 1,000 cubic feet of acetylene is declared variously to cost $5.45, $6, $8, $10, $11.11 and $12. For city gas the average would be nearer $1.50, while at the present prices acetylene will cost the consumer at least $13.33, although in the two cases of town lighting now in operation the price is $20 per thousand at the consumer's meter. The price of carbide in 100-pound drums f. o. b. Niagara is 4.5 cents per pound, but this does not include transportation or dealer's expense and profit. Tests with the best English carbide at the acetylene exhibition held in London last Summer showed that the best automatic generators delivered 4.5 cubic feet per pound of carbide; deducting the low percentage of six for house leakage brings this down to 4.2 cubic feet per pound. This figure is not for the average generator, but the best of the automatic type; the poorer class were found to give a yield as low as 3.5 cubic feet per pound. The dealers in generators charge from five to eight cents per pound for carbide, an average of 10 American dealers giving the average price of 5.6 cents per pound. Calculating with these figures the cost of $13.33 per 1,000 cubic feet was arrived at.

The above figures would lead to the following results, which represent pretty well actual conditions:

City gas (cost per 100 candle-power hours)	$1.36
Acetylene (cost per 100 candle-power hours)	2.77
Ratio	0.5

We, therefore, make out that city gas costs half as much as acetylene for equal illumination, instead of 2.6 times, as acetylene generator makers claim.

Consumers are often led astray by the extravagant claims of agents; the above ratio of 0.5 to 2.6, or about one to five, is a pretty wide margin to allow for proper enthusiasm or even self-interest, and can properly be termed extravagant, and it is about time gas companies began a campaign of education among those of their consumers who are being solicited by generator agents. . . . It were wiser for generator makers to confine their claims to facts, and facts only. Although a large proportion of people can always be deceived, there are a formidable few who will resent such low estimates being placed upon their intelligence.



"WAVE-FORMS AND TRANSFORMER LOSSES"—CURVES OF CURRENT AND VOLTAGE.

The Pacific Cable.

There is every likelihood that the Britishers will be first in the field with a complete Pacific cable system, in spite of recent attempts to push similar enterprises with American backing. The Canadian House of Commons is preparing to pass a bill providing for a cable between Canada and Australia. The cost is to be proportionately borne by Great Britain, Canada and the Australian colonies, and the control of the cable will be vested in an imperial commission, each contributing colony being represented thereon. It is noteworthy that during the recent war the bulk of American dispatches from the seat of conflict was carried by foreign cable companies, but fortunately their neutrality as common carriers was never impugned.

In commenting upon this situation the Chicago *Chronicle* says, "the laying of a Pacific Ocean cable has become a commercial as well as a military necessity. If Great Britain is to be the owner of the first one put in operation there will be additional cause for maintaining a peaceable friendliness with that power."

A telephone line from Russellville, Ky., to Buena Vista Springs is almost completed.

A HISTORY OF THE SUBMARINE TELEGRAPH.

THE DEVELOPMENT OF SUBMARINE TELEGRAPHY THROUGHOUT THE WORLD CHRONOLOGICALLY ARRANGED.

The following compilation has been made from a number of reliable sources, though mainly from "Submarine Telegraphs," by Charles Bright, F.R.S.E. It gives the history of submarine telegraphy in its chronological order and with great completeness.

1795. Submarine telegraphy suggested by Salva, a Spaniard, before the Barcelona Academy of Sciences.

1797. Salva proposed submarine communication between Barcelona and the island of Majorca.

1803. Aldini, nephew of Galvini, performed experiments in the transmission of electric signals under the sea near Calais, France.

1812. Schilling ignited gunpowder by electricity transmitted through a subaqueous conducting wire under the Neva River near St. Petersburg.

1813 Electric signals transmitted through seven miles of insulated subaqueous wire by John Robert Sharpe, of England.

1838. Practical telegraphy under water demonstrated by actual experiment by Colonel Pasley, of the Royal Engineers, at Chatterton, Eng.

1839. Dr. O'Shaughnessy, director of the East India Company's telegraph system, transmitted telegraphic signals through insulated wires under the river Hugli, in India.

1840. Prof. Charles Wheatstone, of England, suggested the practicability of connecting Dover, England, and Calais, France, by a submarine telegraph.

1842. Prof. Samuel F B. Morse, of the United States, transmitted electric currents and signals through an insulated copper wire laid for that purpose between Castle Garden and Governor's Island, in New York Harbor, demonstrating the practicability of submarine telegraphy.

1843. Professor Morse suggested submarine electric communication between the United States and Europe. Samuel Colt, of the United States, operated a submarine telegraph between New York city, Coney Island and Fire Island.

1845. Ezra Cornell, of the United States, laid and successfully operated 12 miles of submarine copper wires in the Hudson River, between New York and Fort Lee, continuing its use several months until its destruction by ice. These wires were insulated with cotton and enclosed in a leaden pipe.

1846 Charles West granted permission by the British Government to establish telegraphic communication between Dover, England, and Calais, France.

1847. J. J. Craven, of the United States, a resident of New Jersey, demonstrated the practicability of submarine telegraphic service by conducting a section of the New York and Washington telegraph line through the waters of a small creek by a wire insulated with gutta-percha without interfering with the service of the line of which it thus formed an intermediate section.

1848. Armstrong proposed in the New York *Journal of Commerce* a submarine telegraph across the Atlantic.

1849. Telegrams exchanged over a combination of aerial and submarine wires between London and Folkestone, Eng.

1850. Submarine telegraph lines laid across the English Channel and signals exchanged, but soon ceased to operate, the insulation proving insufficient.

1851. A cable containing four copper wires, insulated with gutta-percha and surrounded by tarred hemp and protected by 10 galvanized iron wires wound spirally about it, laid across the English Channel by a company of English and French capitalists. This line worked successfully and was opened for public telegraph business November 13, 1851, being the first successful submarine telegraph and continuing in constant use many years. Its weight was seven tons to the mile; length, 25 miles; depth of water, about 120 feet; it was laid from an oblong coil on a ponton hull or barge towed by two steamers.

1853. Six submarine telegraph cables laid, connecting England with Ireland, Scotland and the continent of Europe, the longest being about 100 nautical miles, and all proving successful.

1854. Five additional cables laid in European waters, the longest being 64 miles.

1856. Several additional cables laid in deeper waters than on former occasions; one from Newfoundland to Cape Breton, and one from Spezia, Italy, to Corsica, at a depth of 600 feet, weight eight tons per mile.

1857. First attempt to lay a submarine telegraphic cable across the Atlantic Ocean, the enterprise being headed by Cyrus W. Field, of New York, and Charles Bright, J. W. Brett and others, of England. The cable was to extend from Valentia, Ireland, to Newfoundland, the length of cable necessary being estimated at 2,500 miles. The construction of this cable was similar to that across the English Channel, already described. After 255 miles had been laid from Valentia westward, the cable broke and the work was abandoned.

1858. Renewal by Mr. Field and his associates of the attempt to lay a submarine telegraphic cable across the Atlantic. The United States naval vessel "Niagara," and the British naval vessel "Agamemnon," carrying each one-half of the cable, proceeded to mid-ocean, and after joining the ends of their respective sections, on July 29, proceeded westward and eastward, paying out the cable and reaching their respective destinations, Newfoundland and Valentia, on the same day, August 5, 1858, when electrical connection between the continents was at once established over the 2,050 nautical miles of cable which they had thus laid. Congratulatory messages were exchanged between the President of the United States and the Queen of England, and there were public rejoicings in both countries over what was pronounced the great event of the century. After less than one month of operation, however, the cable ceased working and it was never operated further, nor was any part of it ever recovered. During the time of its operation, 730 messages of about 10,000 words were passed over it. Its total cost was $1,256,250.

1859. A submarine telegraphic cable to connect England with British India was laid through the Red Sea and Arabian Sea to Kurrachee, India, having a total length of 3,043 nautical miles, but with several intermediate landings. Some portions of the line worked satisfactorily for 30 days, but few if any messages were ever sent through the entire line, and it soon proved a complete failure.

1860. Elaborate study of the entire subject of submarine telegraphs and the construction of cables was made by a committee appointed by the British Board of Trade, resulting in an expression of the belief that submarine telegraphy might, despite past failures, become successful and profitable if sufficient care were exercised in constructing, laying and managing the cable.

1861. A submarine telegraphic cable, which had been manufactured with great care, was laid across the Mediterranean from Malta to Alexandria, Egypt, with intermediate landing places at Tripoli and Benghazi. The cable consisted of seven copper wires stranded together, covered with several coatings of gutta-percha alternated with other non-conducting and waterproof material, and in turn covered and protected by 18 iron wires wound spirally about this core This cable proved a permanent success and went into general operation shortly after its construction. The speed of transmission, which on the Atlantic cable and the shorter submarine lines had been three words per minute, was brought up to 10 words per minute on each separate section, but was only three words per minute when all the sections were united and operated as a single line of 1,331 miles.

1862. A submarine cable which had been laid across the Mediterranean Sea between France and Algeria in 1861 proved a complete failure after a few months of experiment.

1864 Construction of a cable line to connect India with England undertaken by the Indian Government, the line to be laid through the Arabian Sea and Persian Gulf to connect with land lines, thence to Calais and by the short submarine line under the British Channel to England. The submerged line in the Arabian Sea and the Persian Gulf had a total length of 1,450 miles, but with three intermediate landing places This line consisted of a copper core surrounded by layers of gutta percha, alternated with other non-conducting and waterproof material, being protected by an outer sheathing of 12 galvanized iron wires wound spirally about it, which in turn were protected by double wrappings of tarred hemp yarn. All of these materials and the various sections of the cable were constantly and thoroughly tested electrically and otherwise during its construction The line when laid proved a complete success, becoming the first successful telegraphic connection between England and India.

1865. Another attempt made by Cyrus W. Field, of the United States, and his associates in the United States and England to lay a submarine telegraph cable from Valentia, Ireland, to Newfoundland and the United States. The cable, for which the contract price was $3,000,000, partly in cash and partly in shares of the company, consisted of seven copper wires surrounded by numerous coatings of gutta-percha and other waterproof non-conductors. This was in turn surrounded with 10 Bessemer steel wires, this being the first use of steel wires for cable protection, each wire being separately wound with pitch soaked hemp yarn, the shore ends being also further protected by 36 heavy iron wires wound spirally about the completed cable. The steamer "Great Eastern," then the largest steamship afloat, was specially fitted up for laying this cable. Great care was exercised in every particular, but after 1,186 miles had been laid westward from Valentia the cable broke in water over 11,000 feet deep, and the attempts to recover it were unsuccessful.

1866. Mr. Field and his associates renewed their efforts to lay a cable across the Atlantic. A new company with $3.000,000 capital was formed with the double purpose of attempting to find the end of the cable partially laid in 1865 and complete the line, and also to lay another cable parallel with and near to it. The cable manufactured for the proposed new line was similar to that of 1865, but with the shore ends also protected by wrappings of tarred hemp outside the 36 iron wires which surrounded the cable proper. The "Great Eastern" was remodeled to further meet the requirements of the work, and left Valentia, Ireland, July 13, 1866, paying out the cable in a line about 25 miles north of that followed on the preceding year. She arrived safely at Newfoundland in 14 days from the date of leaving Valentia, and electrical communication was immediately established between the United States and England, which has never since been more than temporarily interrupted. The "Great Eastern" then returned to the spot where the cable was lost in 1865, and after 18 days' work succeeded in bringing the end on board from a depth of over 11,000 feet, the tests immediately made showing it to be in perfect working connection with the Valentia end. A splice was made and the laying of the line toward Newfoundland resumed, and on September 8 the cable was landed at that point and the second successful line of communication between the United States and Europe thus completed, Newfoundland being already in submarine telegraphic communication with the mainland and telegraph systems of the United States The length between Trinity Bay, Newfoundland, and Valentia, Ireland, is given by the American Cyclopædia at 2,134 miles. The rate of speed in transmission over these cables was at the beginning eight words per minute, but increased to 15 words per minute.

1868. A second Anglo-Mediterranean line, laid from Malta to Alexandria, proving a complete success.

1869. First French Atlantic cable laid from Brest, France, to Nova Scotia, proving successful on completion. A line from Suez to Bombay, India, also successfully laid by the British Indian Submarine Telegraph Company.

1871. Cables laid by the Great Northern Telegraph Company along the eastern coast of Asia connecting Hongkong, Shanghai and Nagasaki with the terminus of an overland telegraph line running from St. Petersburg through Russia and Siberia to Possiet Bay near Vladivostok, Siberia. This transcontinental land line had been constructed after the failure of the Atlantic cable in 1858 with the purpose of obtaining land telegraphic communication between Europe and America by way of Russia and Siberia, with a short cable across Bering Straits and a line thence through Alaska and British North America to the United States. The project was, however, abandoned on the success of the Atlantic cable in 1866, and the line from St. Petersburg to the eastern coast of Siberia was utilized to connect the European telegraphic system with the newly laid cable lines along the eastern coast of Asia, stretching southward from Vladivostok by way of Nagasaki and Shanghai to Hongkong, Straits Settlements and Australia.

1872. Amoy, China, connected with the cable system of the Great Northern China-Japan line by tapping their main cable directly opposite that point.

1873. Cable laid between Brazil and the British West India Islands, connecting there with a cable line to New York and thence to Europe. Cable also laid between Lisbon and Madeira.

1874. The duplex system applied to submarine telegraph lines, nearly doubling the capacity of the cable systems to which it is applied. Over 50 per cent of the cable lines of the world are now duplexed.

1875. New Atlantic cable between Ireland and the United States completed. Also lines laid between Jamaica and Porto Rico, Constantinople and Odessa, and elsewhere.

1876. Cable lines laid along the west coast of Africa; also along the western coast of South America

1878. Port Natal, Africa, and the Cape of Good Hope connected by cable; also lines extended along the eastern coast of Africa.

1879. New French cable laid connecting France and the United States; further extension of lines along the eastern coast of Africa.

1880. Company formed to lay cable lines across the Gulf of Mexico, connecting with an overland line at the Isthmus of Panama; thence connecting with cable lines on the western coast of South America, giving direct communication between that coast, the United States and Europe.

1881. New transatlantic line laid by the American Telegraph and Cable Company, headed by J. Gould.

1882. Another Atlantic cable laid by the same company. Lines also laid on the west coast of South America.

1883. Spanish National Telegraph Company organized to construct a cable line from Spain to the Canaries.

1884. Two transatlantic cables laid by the Commercial Cable Company organized in the United States, headed by J. W. Mackay and James Gordon Bennett.

1885 Additional cables laid on the west coast of Africa.

1886. Cable lines laid in the Mediterranean, to connect Italy with various adjacent islands.

1887. French colonies in the West Indies connected by cable with French Guiana and La Guayra, Venezuela.

1889. Cable line authorized by the British Government to connect Halifax and the Bermudas. This line passes through water 17,000 feet deep.

1891. The French Government contracted for lines from Marseilles to Oran and Tunis, to be constructed exclusively by French workmen and of French material where practicable.

1892. Cable laid across the South Atlantic from west coast of Africa to Pernambuco, Brazil, by the South American Cable Company.

1893. Cable line laid from Australia to the French colony of New Caledonia, 800 miles distant.—Lines laid under direction of the Portuguese Government, to connect the Azores with Lisbon, Portugal.

1894. Two additional trans-Atlantic lines laid by the Commercial company and one by the Anglo-American company. These consisted of a very large copper wire weighing from 500 to 650 pounds per mile, surrounded by 12 smaller wires. These were heavily insulated and again surrounded by a sheathing of steel wires, which in turn were surrounded by a heavy waterproof protection. The object of adopting the very heavy copper wire was to facilitate the use of automatic sending machines, by which the speed of transmission is greatly increased.

1896. Cable laid from New York to Cape Haitien, Haiti, with connection thence to Santiago, Cuba, and a southern line to the Windward Islands and South America, with a depth at places of 18,000 feet, the greatest depth at which cables have been laid. It was over this line that the chief telegraphic communication between the United States and its representatives at Santiago, and in the West Indies generally, was conducted during the war between the United States and Spain, the cable lines by way of Havana being under control of the Spanish authorities in Cuba. Messages from the Executive Mansion and War and Navy Departments passed from Washington to New York by land line, were there transferred to the cable, thence to Cape Haitien, where they were transferred to the cable line running to Santiago, which had been cut near by the United States Signal Corps, and landed at Caimanera, which was controlled by the United States forces. There the messages were transferred from the cable to the land line reaching to the battlefield in front of Santiago. Messages from the War Department and Executive Mansion reached the battlefield in from 10 to 15 minutes, and on one occasion during the progress of the battle a message was sent and reply received within 12 minutes.

1897. The Halifax–Bermuda cable line extended from Bermuda to Kingston, Jamaica, by way of Turks Islands.

1898. An additional trans-Atlantic cable laid by the French company between France and the United States.

PERSONAL.

Mr. D. Mazinet, of the General Electric Company, has just returned from a trip to Mexico.

Mr. Weare Parsons, of Chicago, has been recently appointed superintendent of the Southwest Electric Light and Power Company at Joplin, Mo.

Dr. Louis Duncan, chief engineer of the Third Avenue Railroad Company, of New York city, has taken a house for the Summer at Pelham Manor.

Mr. E. Rowland Phillips, vice-president and superintendent of the American Electrical Works, Providence, R. I., ran for the town council of East Providence on the straight Republican ticket, in a recent election, and received the handsome majority of 31—a large proportion of the total vote. Mr. Phillips is a son of Mr. Eugene F. Phillips, so well known to members of the electrical fraternity, and is a rising and progressive young gentleman.

Electricity in the Catacombs.

[*From Scribner's Magazine.*]

If there is one thing more than any other with which Americans have credited the Old World, it is reverence for its antiquities. If we have occasionally curled the lip of scorn in "acrid Asiatic mirth" over the vauntings of the cicerone, envy has been behind it, and at heart we too have shared their piety. The refusal of permission to exhibit wild cowboys and tame Indians in the Coliseum met, on the whole, with our approval; and we recognized the self-denial of the debt-ridden Italian Government in declining the offers of syndicates to bring that structure bodily to the World's Fair at Chicago.

But what is to be said of a newspaper report that the very tomb and crypt of the venerable past is to be opened to the garish spirit of end-of-the-centuryism, and that the Catacombs of Rome are to be lighted by electricity? Worse yet, that the work is to be done by Americans, and that the invasion of these sacred reliques of the Old White City is to be intrusted to the smoky modern town of Pittsburgh?

It is reported that an electric light company of our smoke metropolis has received a contract for the placing of six electric motors (*sic*) in six Catacombs of Rome, each motor to be capable of furnishing 460 incandescent lights. These are the bald facts; their spiritual significance roots deep. What now is to become of our reproach of the Goths and Longobards, who looted the catacombs with pious motives and called every bone found in Roman soil a sacred relic and carried it northward home, in mingled commercialism and reverence? What will they think of our innocent electricians trespassing in the sanctum of these ancient dead with their rude labors and lighting with unseemly illumination their sleeping chambers?

What now will be the occupation of the skull of which Hawthorne writes in his "Marble Faun:" "grinning at its own wretched plight as is the ugly and empty habit of the thing?" What business have they left now to Memmius, that limited Wandering Jew in his labyrinthian parish; that sneaking spy of Diocletian's time, who, hiding in the Catacomb of St. Calixtus to overhear the rites of the persecuted Christians, was cursed and condemned to wander forever in the gloomy precincts of these tombs? What power now can he have to thrill and threaten the lone wanderer in the maze? What potency is left to the spell of his terror; what virtue to his fable? How can Memmius claim to be eternally lost when he has good electric lights and sign-boards to guide him wherever he would go?

But our shameless electricians are not to be stopped at the mere lighting up of these mysteries; they are to put into the St. Calixtus Catacombs an elevator!—not a slow and funeral lift, but a flying electric American elevator! After that, what is to give the Catacombs any power for romance or terror above the horrific Avernus of the Boston Subway? And is this electrocution of their tradition only a beginning? The imagination already supplies abundant sequels.

LATE NEWS.

The cable steamer "Mackay–Bennett," Captain Schenck, has been ordered to proceed from Halifax, N.S., to the West Indies to take soundings for a new cable which is to be laid between Pensacola, Fla., and Havana. She is reported to be engaged by the United States Government.

A press dispatch from Newburg, N. Y., says that the Hudson River Telephone Company is changing the location of its office, and linemen are working night and day in consequence. On April 23 one of the linemen fell asleep over a cross-arm at the top of a 60-foot pole. His hat fell off, and when another lineman climbed up, expecting to find that the man had received a shock, he discovered that he was sound asleep from overwork.

It is reported that the Newport, R. I., Illuminating Company and Street Railway has been sold to the Shaw–Morgan syndicate, which controls practically all the electric roads in that section of New England. They will be run in connection with the Fall River road. The Newport Illuminating Company's stock is principally held by cottagers, the largest holders being H. O. Havemeyer, Jr., Cornelius Vanderbilt, Fred W. Vanderbilt and Louis L. Lorillard.

A Telegraph Magazine.

It is pleasant to welcome to the field of technical journalism as attractive a publication as *The Wire*, a new monthly magazine for telegraphers. It is published by H.C. Jamison, New York, and by its handsome appearance and entertaining quality will probably be warmly appreciated in its own peculiar field.

Wall Street and the Electrical Stock Market.

The week in the stock market has been of an uneventful character. The continued decline in the rates for money has been the most important change in the situation. The indications now favor an easy money market at least until Summer. The state of the country's trade is still wonderfully active, and has never been excelled in previous years.

On the New York Stock Exchange, General Electric closed at 118½ bid and 119 asked, a gain of 2⅛ points for the week. Metropolitan Street Railway, of New York, closed at 250½ bid and 251 asked, a loss of 2 points for the week. Third Avenue Railroad, of New York, closed at 218 bid and 220 asked, a loss of 7 points for the week.

On the Boston exchange, American Bell Telephone closed at 363 bid and no asked price, a gain of 2 points for the week. Erie Telephone closed at 94½ bid and 95 asked, a gain of 2 points for the week.

On the Philadelphia exchange, Electric Storage Battery common closed at 184 bid and 185 asked, a loss of 5 points for the week. Union Traction closed at 42⅞ bid and 43 asked, a loss of 1 point for the week.

On the curb, or outside market, in New York, Electric Vehicle closed at 136 bid and 141 asked, a gain of 4 points for the week.

Electric Boat closed at 33 bid and 34 asked, a loss of 2 points for the week.

Wall Street, April 22.

Sale of the Fort Wayne Electric Corporation's Plant.

The factories of the Fort Wayne Electric Corporation at Fort Wayne, Ind., were sold on April 18, by order of court, to the General Electric Company, the heaviest creditor, for $356,400. The appraised value of the plant was $534,500.

It was stated that work in the plant would begin this week with a force of 150 persons, this to be increased to 500 as rapidly as material can be secured. A local company, under the name of the Wayne Electric Company, will be formed to take charge under control of the General Electric Company. If after eighteen months a profit can be shown, the works will remain, it is said, at Fort Wayne and become the western distributing point for the General Electric Company.

CHICAGO ELECTRICAL TRADE NEWS.

The National Electric Company, of Detroit, Mich., has lately been organized, with a capital stock of $50,000. The new company will manufacture a general line of electrical supplies. The gentlemen interested in the new incorporation are John T. Nichols, Frank G. Smith, Theo. Luce, Jr., Lewis T. Bennett, Harry H. Wright and A. H. Sibley.

The American Electric Vehicle Company, of 1,545 Michigan avenue, Chicago, will move their offices and factory this week to a larger building and more convenient location at 56 West Van Buren street, Chicago. General Manager Corrigan states that they have recently received several large orders for electric vehicles, to be built during the coming Summer.

Mr. J. M. Knox, late of the Varley Duplex Company, has become associated with the McIntosh Battery and Optical Company, of Chicago, manufacturers of static electric specialties, optical goods and physicians' electric specialties. Mr. Knox's ability as an electrical engineer and wide acquaintance in electrical matters will make a valuable addition to the sales departments of this company.

Hollister Brothers, No. 148 Monroe street, Chicago, printers and publishers of posters, are installing a number of Western Electric Company motors in their pressroom. The Great Northern Hotel, which for many years has been supplied with current from the central station, has recently transferred its load from street mains to its own plant, which consists of three 150-kilowatt Western Electric generators.

Mathias Klein & Son, 87 North Van Buren street, Chicago, are at present very busy supplying the demands of the telephone and electric light companies in construction supplies. The company have been kept busy all Winter manufacturing, and now that Spring construction is just opening they are meeting with a large sale of their products, among which are Klein's climbers, a popular and desirable article for every lineman.

The Farr Telephone and Construction Supply Company, of 357 Dearborn street, Chicago, have just issued to the telephone trade a neat pamphlet of testimonials from a number of their customers. Over 1,000 independent telephone companies in the United States are patrons of this company, and their products have met with well deserved success. Only a short time ago they found it necessary to increase their space for manufacturing, and growing business has made them well known supply dealers.

The American Battery Company, Clinton street, Chicago, owing to the growing demands of their business, have been obliged to increase their space for manufacturing, and they now occupy two large stores and basements in the building at 172–174 Clinton street, in the heart of the manufacturing district of Chicago. American storage batteries and cells have become well known throughout the country, and the sales are constantly increasing. This battery is becoming very popular with telephone exchanges.

The Stromberg–Carlson Telephone Manufacturing Company, West Jackson Boulevard, Chicago, are sending to their friends and customers, among the independent telephone exchanges, circulars, newspaper notices and extracts from the ELECTRICAL REVIEW and several electrical journals, saying that they propose to remain a strictly independent company for the manufacture of independent telephone apparatus. The Stromberg–Carlson company have always enjoyed an excellent trade, and their apparatus is known to be strictly first-class, and it is claimed to have given the best of service wherever it was installed.

F. E. C.

OBITUARY.

Col. D. P. Livermore, the oldest telegrapher in the country, recently died at Hallowell, Me. He was 94 years old. He learned telegraphy in the 40's, and soon after assumed the duties of operator and manager of the Hallowell office of the Kennebec Telegraph Company. This company was later absorbed by the Western Union, but Colonel Livermore retained the management continuously until 1891. During the early days of the office hardly more than two messages were handled each day, which, at that time, was considered a good day's business. It is said that a daughter of Colonel Livermore was the first woman to read telegraphy by sound.

Electric Storage Battery Company.

A special meeting of the stockholders of the Electric Storage Battery Company, of Philadelphia, has been called for May 4, at noon, to vote on a proposed increase of $4,500,000 on the common stock of the company, making the total stock capitalization $18,000,000.

Consolidation of Electrical Manufacturers in Boston.

An important consolidation of electrical manufacturers has just taken place in Boston. The combination will, hereafter, be known as the Chase–Shawmut Company, and will occupy all but the first floor of the building at 161 and 163 Fort Hill square, Boston. The officers of the new company are Charles Sprague, president; F. W. Stone, treasurer; Charles Garrison, manager manufacturing department, and Sears B. Condit, Jr., manager sales department.

The companies entering into the combination are L. A. Chase & Company, who have been known as manufacturers of dynamos and motors, and who have done a large business in switchboard and repair work; the Shawmut Fuse Wire Company, whose standard fuses are widely known; the John P. Cushing Company, who have made and installed a large number of theatrical switchboards, and the Linton Manufacturing Company, of Worcester, Mass., makers of switches and switchboards.

These companies have all been more or less connected with each other in a business way, and advantage has been taken of this fact to form the Chase–Shawmut Company, which merges the separate businesses into one. The principal officers and employés of the four companies named will remain with the new company, which will manufacture electrical specialties of all sorts.

Independent Telephone Trunk Lines in Ohio.

The work of connecting the various independent telephone exchanges in Ohio is progressing at a very satisfactory rate. The United States Telephone Company, of Cleveland, has closed long-time contracts with a great majority of the important exchanges in that state, and is now constructing first-class, full-metallic copper lines throughout the state in order to connect these various exchanges, forming a first-class system covering the state of Ohio. Its construction consists of 25, 30 and 35-foot poles, mostly 30, with No. 10 copper wire for the main lines, with ten-pin cross-arms, arms thoroughly braced. A large force of men is at work securing right of-way consents, and, where necessary, lines are run through private property in order to avoid sharp curves. Many of these lines are expected to be in operation by the early Summer.

ELECTRIC RAILWAY NOTES.

The Attleboro, Mass., & Norton electric system, the Norton & Taunton line, the Mansfield & Norton, and the Eastern & Mansfield electric street companies have been consolidated.

The Erie–Cambridge Motor Company has been chartered with a capital of $425,000. The electric road will be built at an early date, and is designed to carry trade from the springs to Erie instead of to Cleveland, Ohio.

The report of the Cohoes City, N. Y., Railway Company for the quarter ended March 31 shows:

	1898.	1899.
Gross earnings	$5,386	$6,058
Operating expenses	7,657	6,768
Deficit from operation	2,271	710
Fixed charges	1,630	1,598
Deficit	3,902	2,308
Cash on hand	....	479
Profit and loss (deficiency)	...	15,429

The Clarion River Railway, of Ridgway, Pa., has been sold for $180,000 to a syndicate of New York capitalists headed by John Byrne. Connections will be made with the Buffalo, St. Mary's & Southwestern Railroad by extending the road from Croyland to near Centreville.

The United Power and Transportation Company has been incorporated at Trenton, N. J., with a capital stock of $12,500,000. The object of the company is to furnish power by air, water, gas, electricity, gravity and other means. The incorporators named are employés of the New Jersey Corporation Guarantee and Trust Company.

The first step in the consolidation of all the street railways of St. Louis into one system was taken on April 20, after months of planning and negotiations, when the stock of the Lindell Railway Company was increased from $2,500,000 to $10,000,000. The increase will be made by issuing $5,000,000 preferred stock and the remainder in common stock. Bonds for $10,000,000 will be issued at once.

The quarterly report of the Glens Falls, N. Y., Sandy Hill & Fort Edward Street Railway Company for the period ended March 31, has been submitted as follows: Gross earnings from operations, $13,773.89; operating expenses, excluding taxes, $8,578.21; net earnings from operations, $5,195.68; fixed charges, $2,866.95; net income from all sources, $2,338.73. The general balance-sheet of the company shows a profit and loss surplus of $15,243.86. A dividend of one and one-fourth per cent has been declared, payable May 1.

Electrical Works in Brussels.

Statistics show that in 1893, 3,030 lamps met the requirements of consumers of electricity in the city of Brussels, says the United States Consular Reports. At the present time, there are 66,000 lamps. In consequence of the constantly increasing use of electricity, the city has been obliged to enlarge its works. It is now proposed to acquire five new vertical engines of 1,000 horse-power, to be placed in the works already supplied with five horizontal engines of 500 horse-power. The city also has electrical works established in the basement of the railroad building; but, owing to the steadily increasing use of electricity, the production is insufficient to meet public demands. In consequence it has been decided to unite the two works by means of four cables enclosed in iron pipes. It was at one time proposed to erect a large electrical power-house just beyond the city limits, but the proposition was rejected. The most practical method now seems to be the creation of new stations as the exigencies of the situation may demand.

Street Railways in Mexico City.

Under date of March 30, 1899, United States Consul-General Barlow writes from Mexico city:

The company owning the street railways in this city is about to substitute electric power for the animal traction heretofore employed. There are about 300 miles of tracks in the district, which includes the city. One short line of one and one-half miles is called the Baños (or Baths) line. The rest belongs to the Compañia de Ferrocarriles del Distrito Federal.

Until recently mules have constituted the traction power. They are small, hardy, well fed animals, and travel rapidly. On the outskirts of the city their usual gait is a gallop. For communication with suburban towns the company has some large cars. Arriving at the outskirts of Mexico city, these are coupled into trains of five or more cars, and are thence drawn at good speed by American dummy engines.

Meeting of the American Society of Mechanical Engineers.

The American Society of Mechanical Engineers will hold its thirty-ninth annual meeting at the Arlington Hotel, Washington, D. C., May 9 to 12, inclusive. A programme of papers of great interest has been prepared, as well as many excursions and receptions. Full information may be had from Mr. F. R. Hutton, secretary, at the society's house, 12 West Thirty-first street, New York.

Galvanometers for Cable Testing.

The instrumental difficulties involved in measuring insulation resistance are formidable when more than a few megohms are concerned. For comparatively low insulations, up to 3,000,000 or 4,000,000 ohms, a good

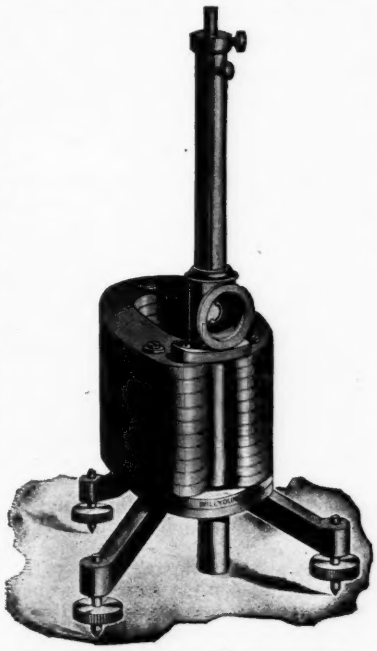
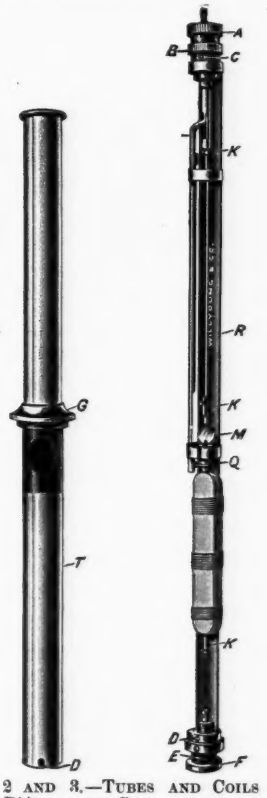


FIG. 1.—D'ARSONVAL GALVANOMETER.

high-resistance voltmeter and a steady source of electro-motive force are admirable; but beyond this it is necessary to employ sensitive galvanometers. Every one who has handled a Thomson galvanometer of great sensitiveness knows how it suffers from external perturbation. For this reason the D'Arsonval type of galvanometer has come to be regarded as the instrument, par excellence, for the practical man. As now made it can be extremely sensitive, extremely stable as regards disturbance by mechanical causes, and totally unaffected by all currents except the one passing through it. Magnetic changes in the neighborhood do not worry it.

The illustrations show a new design of D'Arsonval galvanometer for which many interesting claims are made. The instrument itself is shown in Fig. 1. The field is of laminated special magnet steel, treated according to the most approved process, to insure permanency while, at the same time, giving a field of considerable strength. The coil proper is contained in a tube, which is removable from the magnet in the manner first suggested by Professor Ayrton and Mr. Mather. Fig. 2 shows the tube and coil in section, while in Fig. 3 we have the tube with its sheath removed.

As shown, the tube—using the word in its largest sense—consists of a rib R (Fig. 3), by which are supported the top and bottom torsion heads. A straight fiber above and a helical spring fiber below furnish torsion and, at the same time, carry the current in and out. Over the whole slips the sheath T, which, when in place, is secured against withdrawal by the screw D (Fig. 3). This sheath, thus easily and instantly removable, is one of the greatest claims of superiority over previously conceived instruments. In case of an accidentally broken suspension one needs only to remove the screw D and slip off the sheath T to have the entire system, suspensions,



FIGS. 2 AND 3.—TUBES AND COILS FOR D'ARSONVAL GALVANOMETER.

etc., absolutely free and accessible. The suspensions themselves are all of standard length, and end with bits of No. 22 copper wire, while the torsion heads, as also the top and bottom of coil, are tipped with special conductors K, so made as to just contain the wire. A small set screw is then tightened, and holds them securely.

Another feature is the clamp for locking the system against accident and taking strain from the suspension. Through the center of the upper torsion head runs a spindle or wire L, at the top of which is a milled head A. This spindle (Fig. 3) is bent out as shown, and finally terminates below in a little fork just under the disk Q. The head A will therefore raise L, and hence the coil by the disk Q, until jammed tightly against the holed-out stop above. It should be noted that the clamp spindle passes through the suspension spindle itself. Each moves quite independently of the other.

The mirror M (Fig. 2) is attached to a little slip of foil, and may be bent to any desired angle. It lies exactly in the central plane of the system. The coils are wound with the greatest care of the purest obtainable copper, covered with white silk. Every effort is made to keep iron away from contact with the system. The suspensions are flat phosphor-bronze, and are carefully annealed, so as to be free from drift.

These D'Arsonval galvanometers are furnished with either dead-beat or ballistic tubes, and as they may be interchanged very quickly and without interference with connections, it follows that an instrument with two tubes is adequate for all the necessities of both insulation and capacity work. The sensitiveness of the tubes may be varied up to 1500 or 2000 megohms; i. e., one scale division for 100 volts through 150,000 to 200,000 megohms.

These instruments are also being made into portable cable-testing sets for street service. In this form they are equipped with a telescope and scale, permanently attached, and are mounted in oak or cherry boxes, with sling-straps, etc.

Cable-testing sets with this galvanometer have recently been furnished to the Pennsylvania Telephone Company, New York Telephone Company, Delaware & Atlantic Telegraph and Telephone Company, Standard Electric Company, of California; United States Signal Corps, Safety Insulated Wire and Cable Company, etc.

Mr. James G. Biddle, 1038 Drexel Building, Philadelphia, is selling agent for these apparatus.

A Large New Electrical Instrument Factory.

A fine new factory building is under construction for the Weston Electrical Instrument Company in Frelinghuysen avenue, Newark, N. J. The land has a frontage of 1,400 feet on the avenue. The main building will be constructed first, with a boiler and engine-house, and it is expected that these will be finished in three months. The company will build also a wood-carving shop, a power-house, a japanning shop, and grinding, polishing and copper-plating shops. These will be small buildings. A spur of the Pennsylvania Railroad has been laid to the factory site. The main building will be 240 feet long and 194 feet wide, and will have a basement story and one upper story. The light on the main floor will be supplied from the roof, as the floor will have no windows. About 250 persons will be employed at first, but in course of time it is expected to employ 1,000.

NEW YORK ELECTRICAL EXHIBITION NOTES.

Each of the electrical exhibitions held in New York of late years has been distinguished by some special features. That of 1896 included the best public demonstration of the Roentgen rays, the transmission of power from Niagara, and the sending of a cable message around the world. The exhibition of 1898 included a complete church lit by vacuum tubes, the application of electricity to street car traction, the first series of waxworks ever made to illustrate the history of an art, the theatrophone, and the beginnings of wireless telegraphy. The prominent feature of the 1899 exhibition will certainly be automobilism. The exhibit of electric vehicles will be by long odds the largest and best ever seen in America, and second only to the great exhibits at Paris. In fact, in many respects it will surpass the displays in Europe, because it will illustrate particularly the application of electricity, and because the vehicles shown will demonstrate the high perfection that the art has already reached in this country. This degree of excellence is proved by the fact that while there is no sale for European automobiles here, the manufacturers in America can not ship machines fast enough to keep up with the foreign demand. This automobile exhibit bids fair to be a sensation in New York, illustrating, as it will, the wonderfully wide range of application, carriages and wagons of every type being shown, with many special points of novelty and originality. It has been proposed, in connection with this exhibit, to organize during the show an automobile parade, making a characteristic function of it, after the style of those given in Paris through the Bois de Boulogne. It is believed that something of this character will be arranged while the National Electric Light Association is in session. The fact that to central station sources of supply this great new industry must look for the currents which it is to use gives peculiar interest to the situation, automobile plants being already among the largest consumers that central lighting stations have upon their list of patrons. Several thousand square feet will be occupied by the exhibits of a large number of automobile manufacturers, and, in this way, a convincing proof will be given to the American public that the new industry is fairly launched on its career.

A great many other important features will be brought forward for the first time and in an improved shape at the exhibition, but in view of the intense public interest manifested in wireless telegraphy, the management have undertaken to organize exhibits in that line of work that will be unusually instructive. It will be remembered that, in 1898, mines and torpedoes were exploded in the central tank by wireless telegraph methods, and other experiments of this nature are being planned for this year. But in order that the public may see the whole operation itself at a glance, and at the same time go away without any lurking suspicion of the genuineness of the feat, it is proposed to exhibit complete working sets of the apparatus on a long table of glass, the table itself being set up and insulated by blocks of glass, so that there will be a clear view under and around the apparatus. This table will be about 15 feet long, and messages will be sent from one end to the other, the sending signals and the response at the receiving end being heard at once. Visiting telegraphers, operators from the newspaper officers, and any other spectators will be allowed to send messages or signals themselves. The same apparatus will also be utilized in connection with the experiments for long distance work, and a series of points have been selected between which and the Garden it is proposed to exchange messages. In this manner the public will have a better opportunity than has ever been afforded before of learning for itself the *modus operandi* of an invention which is stirring up the world of science and the outside public fully as much as the Roentgen rays did at the time of their discovery.

Several valuable government exhibits have been secured, and these will be grouped and attractively displayed. They include apparatus from the Army and Navy, the Signal Corps, and the Weather Bureau, and will embrace also not a few interesting electrical relics of the late unpleasantness with Spain.

A special department will also be devoted to electro-therapy, the rapidly widening science of the application of electricity to medicine and surgery, in connection with which a great deal of elaborate apparatus has already been promised. It is the special aim and intention, in connection with this exhibit, to enable the public to learn for itself how far the science of electricity in the cure and prevention of disease has gone. The utmost care is being taken to treat the subject on strictly scientific lines, and a committee of eminent specialists has been organized, whose names alone are a sufficient guarantee for the excellence of the work in this department. Another special section will illustrate the great strides made of late years in the application of electricity to dentistry. Here, again, the pervading relationship of the central station to the later branches of electricity will be emphasized, it being a fact that more and more of the practitioners who employ electricity in their work depend upon the power plants for their supply of current, with the intervention of motors and storage batteries.

A number of spectacular exhibits are also being laid out and elaborated by a committee at whose head is Mr. Luther Stieringer, whose work is so well known in connection with the electric exhibits at Chicago, Atlanta, Omaha, etc. This expert has also taken in hand the lighting of the garden and will produce some entirely new effects, not only beautiful in themselves, but instructive as to the manner in which light should be used for the harmonious illumination of large spaces. A great many of the exhibitors are preparing features of extreme novelty and interest, to which attention will be called as soon as it is proper to do so.

It is a happy coincidence that this electrical exhibition in New York will be in progress at the time that the electrical exhibition opens at Como, Italy, to celebrate the centennial of the momentous discovery of the electric battery by Volta. The Italian exhibition opens on May 15, and it is proposed, therefore, to hold a special celebration at the Garden on Saturday, May 13, from which fraternal congratulations can be sent by cable. The New York Electrical Society, under whose auspices the exhibition of 1898 was given so brilliantly, has undertaken to organize the exercises of this function, and will rally to its aid on the occasion the assistance of other local and national bodies naturally interested in the matter, inviting, also, the cooperation of the Italian officials and societies. President Dunn and Secretary Guy are already at work on this matter, which commends itself generally to all who recognize how great is the debt which is owed to the famous Italian, from whose work, it may be said, practical modern electricity dates.

Last year the basement was devoted almost wholly to exhibits of engines and boilers, and apparatus of that class. Although this was very successful, a great many of the exhibitors desired to be on the main floor. This has been accomplished in the present exhibition by General Manager Nathan, and the basement will thus be available for a series of very interesting exhibits of a special nature, each of which will constitute a separate entertainment and all of which will be free to the public. There will be an electric theater, the theatrophone, an electrical cave of the winds, an electrical grotto, an exhibit of the uses of electricity under water, and several other features of equal attractiveness. Such of the space as may not have been used in this way will be thrown open to inventors and patentees who have meritorious inventions which they wish to introduce to the public and for which they desire to secure capital for exploitation. All likely to be interested in this opportunity are requested to communicate at once with Mr. Marcus Nathan, at Madison Square Garden, New York, who will arrange to provide them with a reasonable amount of space for their apparatus at a small cost and to assist them in every way to make an attractive demonstration. It is believed that many worthy ideas and devices linger in obscurity for want of such an opportunity as this, and the experiment will be given a liberal trial in order to see what it may bring forth of value and importance.

Production and Consumption of Copper in 1898.

Writing from Bamberg, Germany, United States Consul Stern makes the following interesting comments on the development of electrical industries and the production and cost of copper in that country:

"The German copper production, which amounted to 24,688 tons in 1891, had in 1897 risen to 29,468 tons, and is estimated at 30,703 tons for 1898, complete official figures not having been received as yet.

"The German copper consumption was as follows: In 1896, 85,160 tons; in 1897, 96,303 tons; and in 1898, 101,518 tons. Since 1892 German copper consumption has increased by 81 per cent, while the total copper production of the world shows an increase of only 36 per cent for the same period.

"Germany's exports of copper ware have risen from 33,093 tons in 1897 to 36,724 tons in 1898; the imports, chiefly composed of goods of American origin, have risen to 2,443 tons, an increase of 837 tons over 1897.

"England consumed 106,000 tons in 1898, being a decrease of 4,500 tons from 1897. France consumed 55,000 tons, being about 4,000 tons less than the year before. The copper consumption of East Asia is shown to be 22,000 tons in 1898, and that of Russia 6,600 tons.

"The world's total copper production amounted to 397,190 tons in 1897, and is estimated at 420,000 tons for 1898. By far the greater part of this increase in production is to be looked for in the United States, whose production was 216,080 tons in 1897 and 234,272 tons in 1898."

The following table recently appeared in the *Revue de la Semaine*, showing the copper production of the world for the last four years:

Country.	1898.	1897.	1896.	1895.
	Tons.	Tons.	Tons	Tons.
Algeria	50	.....	.....	35
Arg'utine Rep'blic	125	200	100	150
Australia	18,000	17,000	11,000	10,000
Austria	1,100	1,210	1,075	1,110
Bolivia	2,050	2,200	2,000	2,250
Canada	8,040	5,905	4,000	4,000
Chile	24,850	21,900	23,500	22,075
Cape of G'd Hope	7,060	7,440	7,450	7,080
England	550	555	555	580
Germany	20,085	20,145	20,065	16,555
Hungary	430	445	210	200
Italy	3,435	3,480	3,400	2,500
Japan	25,175	23,000	21,000	18,430
Mexico	10,435	11,370	11,150	11,620
Newfoundland	2,100	1,800	1,800	1,800
Norway	3,615	3,450	2,500	2,665
Peru	3 140	1,000	740	450
Russia	6,000	6,625	5 100	5,280
Sweden	480	545	500	515
Spain & Portugal	53,225	54,060	53,325	54,950
United States	234,261	215,460	203,893	172,297
Total	424,126	397,190	373,363	334,562
Aver'ge price Jan. 1 of each year	$250 08	$238 97	$229 85	$2?8 40

It will be noticed that the greatest gains are in the United States and Australia.

Lieutenant Wood Believes the "Gloucester" Sank Two Spanish Destroyers at Santiago.

Lieut. T. C. Wood, U. S. N., president of the Ball & Wood Company, of New York city, manufacturers of the well known steam engines of that name, served aboard the U. S. S. "Gloucester" during the Spanish war, and assisted in working his ship in the famous battle of Santiago on July 3, 1898, when Cervera's fleet was destroyed. Recently the question has been raised as to which of our ships had the most to do with sinking the two Spanish torpedo-boat destroyers, "Pluton" and "Furor," which followed the larger of Cervera's vessels out of Santiago Harbor. In a communication to the New York *Sun*, Lieutenant Wood interestingly expresses his views as follows:

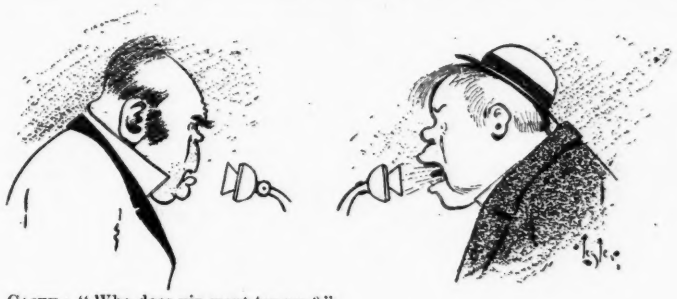
In the *Sun* this morning, April 22, is a dispatch from Santiago de Cuba dated April 21 and headed "'Gloucester' Sank the 'Pluton.'" As I had the pleasure of serving as lieutenant aboard this little ship, won't you allow me to make a brief comment regarding this dispatch in the interest of historical accuracy? It is quite true the "Gloucester" did sink the "Pluton," driving her on the rocks, where she speedily broke up. The vessel referred to in this dispatch, however, was not the "Pluton," but her companion, the "Furor," which sank in deep water after having been riddled with small shell, as stated. I know this from personal observation, since Captain Wainwright gave me permission to board her at the conclusion of the engagement in order to save the ship, if possible, and at any rate the survivors of her crew. What particularly interests us of the "Gloucester," therefore, is the striking confirmation which this dispatch affords of our claims that to this little ship belongs the entire credit of sinking the destroyers, an honor which the larger vessels of our fleet have been eager to share.

As a matter of fact, our large ships were out of range of the destroyers so far as their light batteries were concerned; and these ships had no business to be wasting, and did not waste, their ammunition on two destroyers miles astern, when four Spanish cruisers were escaping to the westward, which they were doing their best to overhaul and capture.

On the morning after the fight Captain Wainwright sent me to the "Iowa" to beg or borrow from Captain Evans a supply of three-pound ammunition, our own having been exhausted in the action. Sitting on the quarterdeck, Captain Evans was chatting with me about the engagement and asked, "Wood, how many destroyers came out yesterday?" "Two," I replied; "only two." "Well," he remarked, "you were all hidden in smoke and I couldn't see very well, but I thought there were three, and I had just trained my after eight-inch guns on the nearest and let fly two shells, when Rogers, my first lieutenant, ran up to me, calling out: 'For God's sake, Captain, don't fire on her; she's the "Gloucester."'" I was able to relieve Captain Evans's mind by assuring him that those two shells didn't come near us, and yet it should be remembered the "Gloucester" was to the westward of the destroyers and consequently the nearest to our fleet.

LITERARY.

In *McClures Magazine* for May, Oscar King Davis, the correspondent of the New York *Sun* at Manila, will relate some stories and give some reminiscences of Admiral Dewey as Mr. Davis himself has seen and known him during months of service beside him at Manila.



CASEY: "Who does yiz want ter see?"
GROGAN: "Dunnohue."
CASEY: "Who did yiz say?"
GROGAN: "Dunnohue—Dunnohue."
CASEY: "Well, if *you* dunno who, how the divil do I know who?"
—*Scribner's Magazine.*

"Fortschritte der angewandten Electrochemie und der Acetylen-Industrie im Jahre 1898." (Progress of Practical Electro-chemistry and the Acetylene Industry in 1898.) By Dr. Franz Peters. A. Kröner, Stuttgart.

This 400-page book is one of the volumes that show, at its best, the spirit of patient research and diligence animating German men of science. It is a compilation of reviews and abstracts of the entire literature of the subjects embraced in its title, with lists of patents in these branches of the electrical arts in all countries. The book is a monument of patient industry, and should be of value to those working along electro-chemical lines.

Scribner's Magazine for May has secured from Major-General Leonard Wood, the military governor of Santiago, the first official account of the great work which has been accomplished in that province. It is practically the making of a state by a military dictator, all of whose purposes are benevolent, and who has no legislature or other authority to consult, deriving his power directly from the President of the United States. General Wood's narrative, which is the only thing that he has written, is marked by a forcible directness and modesty in telling of the things accomplished. The way in which the city was cleaned, the indigent relieved, the streets repaved, schools established, and all the machinery of a civilized government instituted, is a remarkable record of achievement in military government. The illustrations contrast the old Santiago with the new, and show the work of regeneration.

New York Electrical Society.

The 197th meeting of the society will be held at the College of the City of New York, Lexington avenue and Twenty-third street, on Thursday, April 27, at 8 P. M. Mr. Reginald Pelham Bolton will give a paper on "Electrical Engineering in Office Buildings."

Among the branches of the subject to be covered are general requirements, conveniences and luxuries of the modern office building, interdependence of the various services, heat, elevators, lighting, power and sanitary work and their essentials, and methods of wiring. A number of experts are expected to take part in the discussion.

A New Electric Company in Richmond, Va.

The Tower-Binford Electric and Manufacturing Company has been incorporated at Richmond, Va., to manufacture electrical specialties and to do a construction and electrical supply business. The capital stock will be not less than $30,000 or more than $100,000. The officers for the first year are: President, Mr. P. H. Mayo; vice-president, Geo. A. Tower; secretary, Julien Binford, Jr.; treasurer, Geo. M. Reid; directors, the foregoing and Wm. S. P. Mayo.

Lower Telephone Rates in New York City.

The New York Telephone Company has issued the following synopsis of rates for direct-line telephone service in the Borough of Manhattan. The new rates, which took effect on April 20, are as follows:

Number of Local Messages to be Sent in One Year.	Annual Rate.	Additional Local Messages.
600	$75	8c.
700	81	8c.
800	87	8c.
900	93	8c.
1,000	99	8c.
1,100	105	8c.
1,200	111	7c.
1,500	126	7c.
1,800	141	6c.
2,100	153	6c.
2,400	165	5c.
2,700	174	5c.
3,000	183	5c.
3,300	192	5c.
3,600	201	5c.
3,900	210	5c.
4,200	219	5c.
4,500	228	5c.

Contracts will be taken, or renewed, at the above figures only, but in making adjustments the entire schedule (which advances from 600 to 4,500 by steps of 100) will be taken into consideration.

Our Prize Offer Creates Interest.

[*From the Brooklyn, N. Y., Times.*]

The ELECTRICAL REVIEW offers three prizes for the three most fitting names for what it calls "the electrically-propelled, self-contained vehicle for roads and streets." Dr. Louis Duncan, chief engineer of the Third Avenue Railway Company, J. J. Carty, chief engineer of the New York Telephone Company, and Charles Blizard, New York manager of the Electric Storage Battery Company, have consented to act as a committee to select the most fitting name. This is a matter of considerable importance, and the ELECTRICAL REVIEW is entitled to thanks for its effort to save the language from being burdened with an unfit name for the vehicles of the future.

A Great Electric Ventilating Fan.

The well known Hoosac Tunnel, near Fitchburg, Mass., will soon be thoroughly ventilated. One of the largest ventilating fans ever built will be placed at the western end of the tunnel, and when it is in operation it will draw the smoke-laden gases and atmosphere from the interior. The fan will be 16 feet in diameter, with a capacity of 600,000 cubic feet per minute. It will be operated by electric power, and the success of this plan will solve a problem that has troubled engineers for over 20 years.

ADVANCE INFORMATION

New Telephone and Telegraph Companies.

COLUMBUS, OHIO—J. H. Neer, W. J. McCullough, L. F. Neer, A. Lonehart and W. L. Hessong, of Butler, Richland County, has incorporated a company to build a telephone line from Sandusky to Portsmouth, through Norwalk, Ashland, Wooster, Mansfield, Millersburg, Newark, Lancaster, Chillicothe and Waverly; capital stock, $10,000.

CHARLESTON, W. VA.—A charter was granted here to the People's Telephone Company, of New York city, for the purpose of operating telephone lines in all the states and territories. The capital subscribed is $2,000, which may be increased to $5,000,000. The incorporators are A. Wilford Hale, George Fruck, Oscar A. Shaw, D. P. Cobb and Frank W. Hubby, Sr., all of New York city.

SHENANDOAH, PA.—The Equitable Telephone Company, with a capital stock of $2,000, for operating telephone and telegraph lines in Schuylkill County, has been incorporated.

POTTSVILLE, PA.—The Anthracite Telephone Company has been incorporated, with a capital stock of $2,000.

WINDSOR, MO. — The Missouri Union Telephone Company has been incorporated; capital, $65,000; incorporators, John J. Russell, Deepwater, Mo.; G. W. Schweer, J. D. Livingston, Mark P. Goodlet, Ed. Willoughby, Ed. H. Mitchell, J. O. Major, all of Windsor, and others.

BUTLER, IND.—The Butler Telephone Company, with a capital stock of $10,000, has been incorporated; incorporators, L. E. Gardner, W. W. Morrison, Sam G. Stone, L. G. Harding.

FREMONT, OHIO — The Fremont Home Telephone Company has been incorporated, with $60,000 capital stock, to operate a telephone system and other electrical exchanges. The incorporators are Sam B. Rawson, A. E. Lord, J. A. Drake, F. H. Andro and T. M. Brush.

ALEXANDRIA, MINN.—The Park Region Telephone Exchange Company has been incorporated. The capital stock is $10,000, and the incorporators, George G. S. Campbell, N. L. Page, Tolef Jacobson, Rudolph Wegener and Fred D. Campbell.

RICHLAND, OHIO—The Ohio Telephone Construction Company, with a capital stock of $10,000.

TIPPECANOE CITY, OHIO — The Tipp Inter-Urban Telephone Company has been incorporated by H. J. Ritter and others; capital, $10,000.

SHELBY, OHIO—The People's Telephone Company has been incorporated: capital stock, $25,000.

LAS CRUCES, N. MEX.—The Masilla Valley Automatic Telephone Company, with a capital stock of $15,000, has been incorporated; directors, Simon B. Newcomb, Edith M. Nichol, Wm. E. Baker.

MCCOMB CITY, MISS.—The Cumberland Telephone Company has finished the long-distance line from this place to New Orleans.

ANNISTON, ALA. — Arrangements have been perfected between the Calhoun County Telephone Company, which has headquarters at O'Hara, and the Lineville (Clay County) Telephone Company, to build a line connecting the two towns and the two systems.

New Incorporations.

ST. LOUIS, MO.—The Scott Manufacturing Company has been incorporated; capital, $4,000; incorporators, Garrard Strode, Ashley D. Scott, J. H. Townsend, Jas. J. Butler, all of St. Louis.

NEW PHILADELPHIA, OHIO—The Goshen Electric Company has been incorporated; capital, $5,000; incorporators, Augustus Boyer, Adam Lieser, Wm. H. Lieser, Augustus A. Lieser, Geo. W. Wilson.

WATERTOWN, N. Y.—The Seneca Edison Company, to manufacture electricity, has been incorporated; capital, $50,000; directors, S. Dana Greene, of Schenectady; Norman H. Becker, of Seneca Falls, and H. M. Francis, of Brooklyn.

CAMBRIDGE, OHIO—The Guernsey Electric Company has been incorporated, with a capital stock of $5,000.

PHILADELPHIA, PA.—The American Electric Manufacturing Company, to manufacture all kinds of electric motors, engines, etc., has been incorporated; capital stock, $1,000,000.

NEW YORK, N. Y.—The American Electroscope Company has been incorporated; capital stock, $50,000; directors, J. J. Alexandre, Isaac Alexandre and A. L. Louis, of New York city.

PATERSON, N. J.—The Sipp Electric and Machine Company, to manufacture electrical machinery, has been incorporated, with a capital stock of $50,000. Incorporators, Grant Sipp, Arthur Goldthorp, Henry Cooper, all of Paterson, N. J.

Electric Light and Power.

BRUTUS, N. Y.—The Weedsport Electric Light Company has been incorporated, with a capital of $15,000. The directors of the company are John Edwards, of Weedsport, and Harrison L. Hoyt and William G. Thorne, of this city. The company has been formed for the purpose of lighting Weedsport by electricity.

MANKATO, MINN.—The Mankato Electric Street-Car, Light and Power Company has been organized in this city, with a capital stock of $75,000. L. S. Lamm, president; O. W. Schmidt, vice-president; S. Wilhartz, secretary, and C. J. Macbeth, treasurer. It is intended to put in another lighting plant and to build and operate an electric street-car line.

PERKASIE, PA.—An electric light plant is to be established here. H. H. Grim is interested.

PIERRE, S. D.—The Utah Chemical, Light, Heat and Power Company, with a capital of $1,000,000, has been incorporated. Incorporators, Abraham Kauffman, E. L. Squire, Rufus S. King.

TURTLE CREEK, PA.—The North Versailles Electric Light Company has let the contract for its powerhouse to A. M. Meanor for $2,000.

New Electric Railways.

WILMINGTON, DEL. — The construction of an electric railway, to pass through St. Michael's, Centreville, Easton and Oxford, is contemplated.

PHILADELPHIA, PA.—The Lehigh Valley Traction Company has begun work at Bethlehem on the rebuilding of its trolley road, at an expense of $40,000.

MONONGAHELA, PA.—The Monongahela City Street Railway Company contemplates extending its line from the Black Diamond to Courtney, a distance of about four miles.

KENOSHA, WIS.—The City Council has granted a franchise to the Milwaukee, Racine & Kenosha Electric Railway Company, for the construction and operation of an electric line through the city.

Increase of Capital.

COLUMBUS, OHIO—The Napoleon Telephone Company has increased its capital stock from $10,000 to $20,000.

MAMARONECK, N. Y.—The Larchmont Electric Light Company has increased its capital stock from $15,000 to $100,000.

MATTOON, ILL. — The Mattoon Telephone Company has increased its capital stock from $10,000 to $25,000.

The Mexican Electrical Trade.

Requisitions from Mexico for prices on electrical material are arriving steadily, and according to shippers one of the most active seasons in this line will exist this Summer. A number of power stations and electric-light plants are contemplated. As the majority of the equipments in such works now in existence in Mexico have been furnished from this country, it is reasonable to suppose that the bulk of the orders to be placed will come to New York, Chicago or St. Louis. Among the most recent applications made to the government for concessions are those of Pedro Amieva, a Mexican capitalist, to erect a power-house in the town of Izucar de Matamoras, state of Puebla. He proposes to install a large power plant for running a number of small manufacturing industries in that section.

WHO CAN NAME IT?

The electrically-propelled, self-contained vehicle for roads and streets lacks a name. Since its appearance as a familiar object in the streets it has been saddled with a variety of designations, some too long, some meaningless, all unsatisfactory. Here are some samples:

Accumobile,	Electrobat,
Autocar,	Electrobug,
Automobile,	Electrocycle,
Automotor,	Horseless Carriage,
Autobain,	Motocar,
Electric Automobile,	Motocycle,
" Cab,	Motor cab,
" Carriage,	Motor car,
" Vehicle,	Motor cycle,
" Wagon,	Whizzer.

In order that this last development of electrical engineering shall no longer suffer under many *aliases*, the ELECTRICAL REVIEW has determined to offer prizes for the best name for it, and invites its readers to compete. Anybody can enter the lists, and all suggestions will be welcomed. Names should be sent, by mail or otherwise, to the Name Committee, care the ELECTRICAL REVIEW, 41 Park row, New York. From time to time the list of names received will be published. The contest will close on May 27, and the names of the winners, together with the designations selected, will be announced in the issue of May 31.

The following prizes are offered:

First prize, $10 and one year's subscription to the ELECTRICAL REVIEW.

Second prize, $5 and one year's subscription to the ELECTRICAL REVIEW.

Third prize, one year's subscription to the ELECTRICAL REVIEW.

The names submitted will be carefully considered by a committee composed of Dr. Louis Duncan, chief engineer of the Third Avenue Railway Company; Mr. J. J. Carty, chief engineer of the New York Telephone Company, and Mr. Charles Blizard, New York Manager of the Electric Storage Battery Company. Communications will be numbered in the order in which they are received, and in case of duplication of the winning names the prize will be given to the sender of that first received.

The Parsons, N. Y., electric light plant has been sold to Walter W. Pratt, a capitalist of New Haven, Ct., who will rebuild the plant and construct it up-to date. The three engines in the power-house will be taken out and a 300-horse-power Corliss engine put in. It is also stated that the new owner now has under contemplation the matter of putting in an electric street car line at the earliest feasible opportunity. The price at which the plant was sold was $40,000.